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Biennial Report Issue

July 1, 1984 - June 30, 1986

North Carolina Wildlife Resources Commission

512 N. Salisbury Street, Raleigh, North Carolina 27611, 919-733-3391
Charles R. Fullwood, Executive Director

His Excellency, The Governor of North Carolina
Members of the General Assembly
Raleigh, North Carolina

Dear Sirs:

I am pleased to present to you the 20th Biennial Report of the North Carolina Wildlife Resources Commission. This report reflects the Commission's activities and accomplishments for the period beginning July 1, 1984, and ending June 30, 1986.

As chairman of the North Carolina Wildlife Resources Commission, I am pleased to report our continuing efforts to establish and provide a sound wildlife conservation program in the best interest of all North Carolina citizens. During the two-year biennium, the Wildlife Endowment Fund principal reached the $5.8 million mark, an increase of over $3 million during the period, and a portion of the earnings on investment of the Fund was designated by the Commission to acquire valuable wildlife habitat and to improve other wildlife programs. Also during the biennium, considerable emphasis has been placed on youth programs which will have long-range beneficial effects in training the state's future citizens to become good stewards of our natural resources. Some of these programs teach hunting and fishing skills and outdoor ethics to youngsters, while others reach students and teachers in our schools through such programs as Project WILD and teacher workshops.

New emphasis has also been placed on finding ways to improve our small game populations, and our sponsorship of the meeting this summer of Southeastern state wildlife administrators has helped establish a basis for helpful cooperation among neighboring states. The North Carolina Wildlife Resources Commission is also pleased to report the continuing and growing success of a non-game program which has already been beneficial in helping restore such species as bald eagles to the state.

The success of these and many other programs has been the result of much hard work and support from you, sportsmen, wildlife commissioners and employees of the agency. We would like to offer our appreciation to all who have helped make this possible and pledge our continued effort to ensure a sound future for our wildlife resources.

Respectfully yours,

Jerry W. Wright

Jerry W. Wright

January, 1987
Volume 51, Number 1

State of North Carolina
James G. Martin / Governor

Department of Natural Resources and Community Development

S. Thomas Rhodes / Secretary

North Carolina Wildlife Resources Commission

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Cover *Unless that English setter is mistaken or perhaps fibbing, there should be a covey of bobwhite quail somewhere in the vicinity. This photograph by Ken Taylor is reprinted from the December, 1985 issue of* Wildlife In North Carolina. *The color photographs that appear in this biennial report issue are reprints of favorites printed in the magazine during the biennium.*

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Report From The Director

Many of the N.C. Wildlife Resources Commission's most important programs are geared towards long-range goals, and that has been particularly true of a variety of programs developed or enhanced during the recent biennium which covers the period from July 1, 1984 through June 30, 1986.

Both the 13-member Wildlife Commission and its staff believe that a sound future for the state's wildlife resources depends upon young people who will be the sportsmen, conservationists and leaders tomorrow. If a good understanding and appreciation of wildlife is shared by this generation and those that follow, many of the problems facing us will be much easier to confront sensibly. During the past biennium, the Wildlife Commission made significant headway in designing and starting programs which will help educate young citizens and also instill appreciation for our wildlife resources as well as ethical behavior in their use.

One of the most successful of these programs has been the youth fishing program called CATCH (Carolina Anglers Teach Children How). Fishing clinics held across the state have been very popular, and Commission and volunteer instructors introduce youngsters to the pleasures of angling with lots of how-to instruction, and a chance to clean, cook and eat the catch. In all the youth programs, outdoor ethics plays a strong part. A youth hunting program is also underway with successful deer and dove hunts, and these programs are expected to grow rapidly, teaching good sportsmanship, outdoor ethics and respect for public and private property.

Closely connected is a comprehensive, well-rounded conservation education program which is now being offered to school-aged youngsters throughout the state's public education system. Project WILD, CLASS Project, and Investigating Your Environment workshops have been very popular and successful, and have already reached approximately 225,000 students. Teacher workshops have trained many teachers in techniques for teaching wildlife and environmentally oriented subjects. This is perceived as a vital need since many teachers do not receive any other basic instruction in these areas. One of the most successful companion publications is the *Carolina Notebook* which is a wildlife education primer published six times per year and delivered to teachers who use them in classroom and field instruction.

"For the first time, these programs have given us access to youngsters in the schools at a time when they are vitally interested in wildlife and outdoor subjects," said Charles Fullwood, executive director of the N.C. Wildlife Resources Commission. "It helps ensure that they grow up with some understanding of how the natural world works, and this knowledge will help them make sound decisions affecting our wildlife resources in the years to come. Youth oriented programs may well prove to have the most significant impact of anything this agency does during these critical years as North Carolina is making the transition to an increasingly urbanized state. That's why this is one of the most important parts of our overall, strategic plan for the future."

One of the byproducts of the rural to urban transition has been the change in wildlife habitat. Changing land-use patterns associated with human population growth and modern farming techniques have placed new limiting factors on many wildlife species, especially small game such as quail, rabbit, squirrels and others. The Wildlife Commission has worked to find ways to maintain and enhance this state's rich and diverse small-game heritage under these growing pressures. This past biennium saw the development of several long-range

Commission Chairman, *Jerry W. Wright, (left) and Executive Director, Charles R. Fullwood Jr. preside at a Wildlife Resources Commission meeting during the adoption of changes in hunting regulations.*

DEBBIE CONGER

DEBBIE CONGER

The current *North Carolina Wildlife Resources Commission is made up of 13 commissioners. Seated is Jerry W. Wright (left), chairman, and Donald Allen Thompson, vice chairman. Standing (left to right) are Eddie C. Bridges, Stuart R. Paine, Eugene Price, Allan D. Miles Sr., Dr. W.H. McCall, M. Woodrow Price, Jack Bailey, Joe Carpenter Jr., Dr. Jack Hamrick, Dr. Richard W. Adams, and Cy W. Brame Jr.*

programs which will deal with the problems facing small game.

Perhaps the most promising of these efforts is the increased use of cooperative programs of research and management among state wildlife agencies, universities and private conservation organizations throughout the Southeast. Governor James G. Martin helped spearhead this cooperative effort by hosting a meeting of southeastern wildlife administrators to begin this process. This brings the best minds together to work on a coordinated plan which will avoid duplication of effort. A small-game study workshop designed to encourage the exchange of technical studies will lead to research projects which will improve the outlook for all small-game populations. One example already underway within this state is a rabbit habitat research study on the Penny Bend Research Area near Butner.

An important thrust in recent years has been the increased attention given to nongame and endangered species of wildlife, and this trend is likely to become more important. Sportsmen have traditionally carried almost single-handedly the immense costs of research, management and enhancement programs for game species (those for which hunting and fishing is permitted), and these programs have also been highly beneficial for nongame and endangered species of wildlife. However, until recently, the means to share this burden has not been easily available to nonsportsmen. The 1983 General Assembly established the income tax refund checkoff to provide a means for funding nongame and endangered wildlife projects from contributions made specifically for this purpose, and this program has provided greater revenues for this work.

Projects to restore bald eagles, brown pelicans, peregrine falcons, loggerhead turtles and other endangered species to North Carolina have met with initial success, and as funds are available, this work will undoubtedly grow. Efforts are underway to find other sources of revenue to help support this vital effort since present revenues are still inadequate.

As part of this program, a special 17-member Nongame and Endangered Species Advisory Committee has been formed, and legislation will be sought to identify and list endangered and threatened species and administer programs in North Carolina for these species.

Obtaining funding for the various wildlife programs has been one of the major goals of the Wildlife Commission in recent years, and although this funding may still fall short, a major step was made with the establishment of the Wildlife Endowment Fund. North Carolina has been at the forefront in developing this type of funding, and our program is being widely copied by other states. The Wildlife Endowment Fund has already raised over $6 million in principal through the sale of lifetime licenses, lifetime subscriptions to *Wildlife In North Carolina* magazine, and tax-deductible donations. This money is invested by the State Treasurer's Office and only the interest is used to support research, management and other wildlife programs. The Wildlife Endowment Fund is growing rapidly, and has the potential to provide a truly innovative and significant means of helping fund wildlife programs now and into the future.

One recent change in this program—a provision to allow lifetime licenses to be purchased with MasterCard and VISA credit cards—has made these licenses affordable to many more sportsmen, and helped the Wildlife Endowment Fund grow even faster. Even so, it will be necessary to find other ways to add revenues and operate with the utmost efficiency.

Modernization of certain types of administrative equipment is underway in an effort to achieve maximum efficiency in the handling of the many complex administrative services, and the Wildlife Commission is converting to computers and word processors to provide faster, more accurate handling of license, boating and magazine records, and to develop electronic storage and retrieval systems for wildlife and fisheries research and management and waterway records.

The availability of matching federal Wallop-Breaux funding will help implement several fisheries-oriented programs. The current striped bass hatchery at Weldon is no longer suitable, and negotiations are underway to develop a hatchery on Carolina Power & Light Company's Shearon Harris Nuclear Station site. If successful, the facility would be in use by 1989 with the help of Wallop-Breaux funds.

Several cooperative fishery research projects will also be undertaken with the help of these federal funds. A cooperative reservoir research project with N.C. State University, and one-year cooperative striped bass study with East Carolina University, are planned. At the conclusion of the one-year striper study, a series of other cooperate projects will be developed, including management of anadromous fish, trout stream improvements, regulation evaluation, use of length-weight tables for fishing tournaments and fish culture projects.

With the anticipated increase in fishing pressure across the state, special projects will be undertaken to improve habitat through bank seeding and fish attractors, to create fishing lanes in obstructed streams and similar projects. Again, Wallop-Breaux funding will be used.

Other popular Wildlife Commission programs such as free boating-access areas, boating safety, and hunter education will be continued and improved. Waterfowl habitat will be an important focus, and the Commission will be looking for ways to protect and improve this valuable habitat and encourage participation by private landowners.

Underscoring all of these plans will be the key function of law enforcement, and in order to enhance this effort, legislation will be sought to increase penalties for certain violations. Enforcement will also be intensified on game lands.

"There are many parts to this overall strategic plan. The Wildlife Commission and the professional staff have invested much thought and effort in its development," said Fullwood. "We feel that it's a good plan that represents the concerns of sportsmen and conservationists about protection and management of our fish and wildlife resources, and that will guide the Commission's efforts in a positive direction through the next biennium." ⊠

Division Of Enforcement

Although wildlife enforcement officers account for less than half of all Wildlife Resources Commission employees, most people immediately picture the highly visible enforcement officer when they hear the agency name. To many people, the local wildlife enforcement officer or "game warden" is the Wildlife Resources Commission. And because these officers represent the state as well as the agency, it is vital that they be knowledgeable and fair, and that they always conduct themselves in a professional and courteous manner.

Training

Good wildlife officers do not come from any particular background nor do they just happen. They are developed from men and women with "the right stuff" who are trained and drilled in their profession.

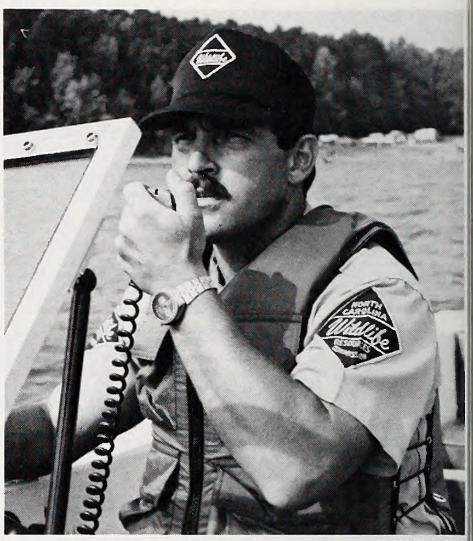
After surviving a rigid selection process in which as many as 1,000 applicants are narrowed to the top 15-20 prospects, new officers attend a 525-hour training school over a 12-week period each summer at the Institute of Government in Chapel Hill. There is only one school per year. Subjects covered include basic law-enforcement skills such as pursuit driving, defensive tactics, law of search and arrest, firearms, and how to prepare court cases as well as extensive coverage of wildlife and boating laws. There also are specialized skills wildlife officers must acquire such as identifying waterfowl, fish, and animals, dealing with problem animals, and motorboat operation and accident investigation. After graduation, new officers are assigned to trainee positions under the supervision of veteran wildlife enforcement officers throughout the state.

Operations

Wildlife officers enforce laws that allow for an equitable harvest of the state's wildlife and fish resources by hunting, trapping, and fishing. Wildlife officers also perform boating patrols designed to regulate boating activity and encourage safe boat operation as well as take part in boater and hunter-safety training programs. Wildlife officers also assist with special investigations into illegal trade or selling of wildlife; engage in search and rescue operations for missing hunters and boaters; give presentations to civic groups and other organizations; assist with youth fishing and hunting programs; pick up "orphaned" wildlife babies and injured animals and deliver them to holding areas or rehabilitation centers; and handle complaints about animals that pose a threat to people or property.

Wildlife law enforcement is dangerous work. During the past biennium, for example, wildlife enforcement officer William A. "Bill" Williamson of Kenansville tragically lost his life in a high-speed automobile accident as he was attempting to assist a fellow officer. National studies also show that if an assault occurs, a wildlife officer is nine times more likely to be killed than officers in other fields of law enforcement. While the vast majority of sportmen checked in the field are law-abiding citizens, serious confrontations still occur every year in which officers are threatened.

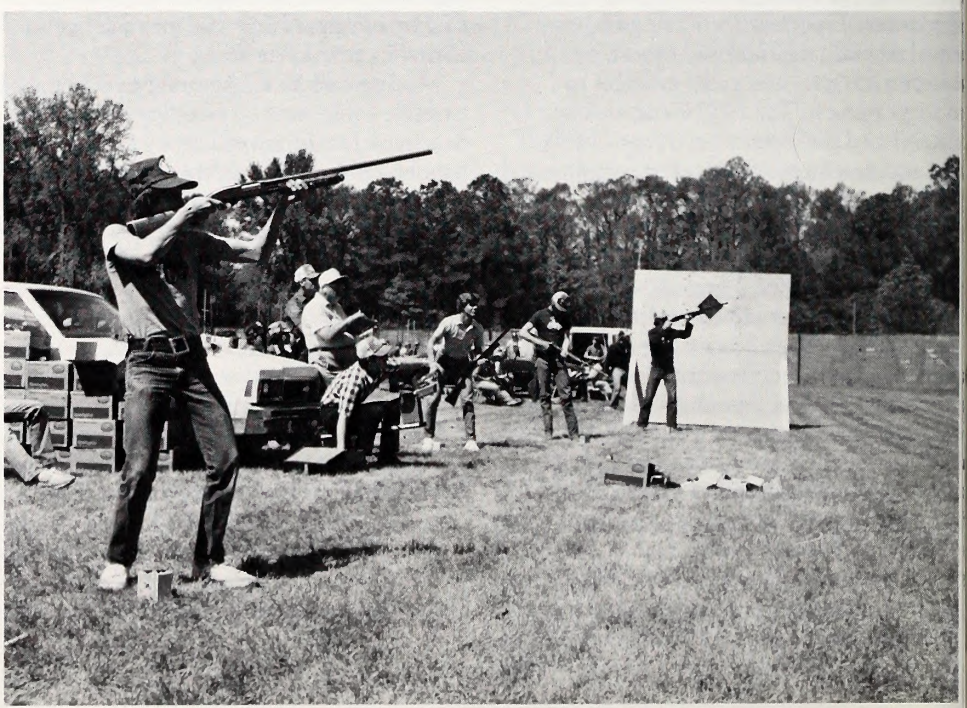
When the North Carolina Wildlife Resources Commission was created in 1947, "game protectors" as they were then called started work with a badge and a book of game laws. Everything else, including clothing, vehicles, and sidearms, had to be furnished by the officer. Today, wildlife officers are not only better trained than in the past, but are also better equipped. Organized poaching rings often use sophisticated methods and equipment to conceal



TERRY SHANKLE

Boating patrols *occupy much of a wildlife enforcement officer's time during the spring and summer. Here, Conley Mangum (above) patrols Kerr Lake.*

The annual *North Carolina Hunter Safety Shooting Tournament (below) is one of the Wildlife Commission's most popular programs. Thousands of students participate in the district, regional and state tournaments.*



CANADA GEESE LARRY DITTO/JANUARY 1986

their activities, and equally sophisticated equipment and resourceful officers are needed to combat the exploitation of our wildlife resources. Quiet, slow-flying spotter aircraft, pursuit and four-wheel drive vehicles, fast patrol boats, and good radio-communications equipment operated by our officers are being brought to bear against violators of wildlife laws.

Illegal Commercialization Of Wildlife

There are those who would exploit and jeopardize our state's wildlife resources for personal gain. The illegal commercialization of wildlife in North Carolina is estimated to be a multi-million dollar business. To combat this extensive wildlife trade, Division of Enforcement personnel work with agents of the U.S. Fish and Wildlife Service to identify and prosecute those engaged in selling game fish, killing eagles, dealing in mounted rare or protected birds, and peddling deer meat.

During the biennium, 156 illegal commercialization cases were made in North Carolina. Several, well-established wildlife crime rings were turned up by special investigations such as Operation Rock—a two-year undercover probe that was undertaken to halt the illegal trafficking in the dwindling stocks of striped bass or "rockfish" from several freshwater Piedmont reservoirs. The operation was a joint investigation by state and federal wildlife officers, and exposed an extensive illegal trade in these game fish extending up and down the East Coast. When terminated, the operation resulted in 29 arrests and $115,000 in fines. Of this, $88,000 is being paid in restitution to the Wildlife Resources Commission to offset the costs of the investigation and to aid in restocking striped bass in Kerr, Gaston, and Roanoke Rapids lakes. Sportsmen have already noted an improvement in striper fishing in these waters since Operation Rock took place.

Other undercover investigations undertaken during the biennium include Operation K, which shot down a deer meat-selling ring in Lenoir County and Operation Mountain Man, which resulted in the arrests of a number of part-time, unlicensed taxidermists who were mounting protected species such as hawks and owls in western North Carolina.

Wildlife Watch

A concerned public is one of the best weapons for controlling wildlife violations, and a growing number of wildlife cases are

Division Of Enforcement

made resulting from information provided by concerned citizens and sportsmen. The confidential, 24-hour, toll-free Wildlife Watch Hotline at 1-800-662-7137 is so heavily used that an additional, incoming WATS line had to be added. Calls are received by telecommunicators in the Division of Enforcement's communications center in Raleigh, and the information is promptly relayed to the officer in the field who is nearest the violation.

Boating Patrols

Boating laws and regulations are designed to protect the lives and property of everyone using our state waters. Public compliance with these laws is the foundation of an effective boating safety program.

While on boating patrols, wildlife officers inspect vessels for required safety equipment, vessel registration, and compliance with fish, game, and boating laws. Enforcement officers on the water and in the air also watch for unsafe boat operation and boats in distress. Our officers frequently are called on to assist in search-and-rescue operations and to render assistance to disabled vessels.

Boating and Hunting Accidents

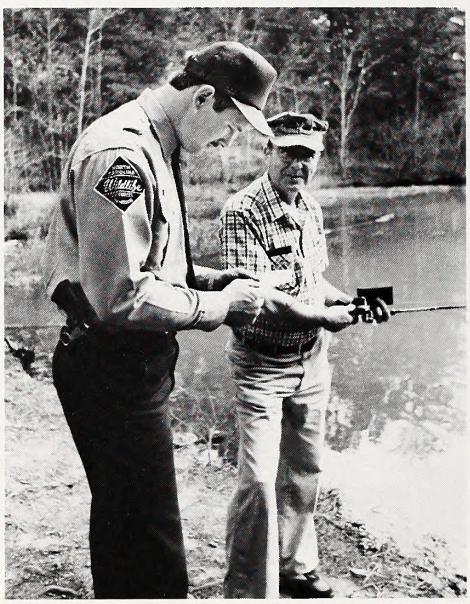
While hunting and boating accidents continued to decline during this biennium, there were some fatalities. In some cases, wildlife enforcement officers were the first to arrive at the accident scene, and their actions and emergency medical assistance have meant the difference between life and death for some accident victims.

However, the usual role of the wildlife enforcement officer is that of an investigator trying to determine the exact nature of the incident, causes, and contributing factors. The officer's investigation report is sent to the Enforcement Division headquarters in Raleigh where it is analyzed with other accident reports from across the state. This information is used to help identify recurring accident factors that can be addressed with specific safety programs or regulations when necessary.

Boater and Hunter Education

Each of the state's nine wildlife districts has an officer specifically assigned to direct hunter and boater education instruction in that area. A Hunter and Boater Safety Coordinator position, established during the biennium, is responsible for coordinating the entire state program, and bringing about continued improvements in both program areas. The goals of the education programs are not only to reduce the number of accidents and injuries associated with these activities, but also to develop a cadre of responsible young hunters and boat operators who respect the rights of others as well

***Wildlife** enforcement officer J.C. Pope (opposite page, left) checks a fisherman at Tuckertown Reservoir while officer George Ford stocks trout in Surry County.*



TERRY SHANKLE

TERRY SHANKLE

WHITETAILED DEER

WILLIAM S. LEA/SEPTEMBER, 1986

TERRY SHANKLE

***An illegal** trapping case (left) resulted in the confiscation of these fox pelts by officers Julian Alman (kneeling) and John Hall.*

Enforcement Summary July 1, 1985 - June 30, 1986

- Number of hunters, trappers, and fishermen checked 307,905
- Number of hunting, trapping, and fishing violations 12,904
- Number of hunting, trapping, and fishing warnings issued 2,382
- Number of boats checked 87,243
- Number of boating violations ... 4,352
- Number of boating warnings issued 7,296
- Number of special inve stigations 164
- Number of wildlife pickups 998

as exhibit good outdoor ethical behavior.

During this biennium period, 56,172 youngsters took an agency-sponsored hunter education course while 162,734 students were given the opportunity to take the boating-education course offered through their school system.

Other Services

Because of the thorough knowledge of lakes, rivers, and forests which wildlife officers acquire in their areas, and the agency's unique position of having officers on land, water, and in the air, the Division of Enforcement frequently has been called on to assist in emergencies and threats to public safety. During the biennium, wildlife officers assisted with tracking down sources of hazardous chemical spills as well as desperate criminals. Our officers have joined forces with other state and public-safety officials and battled forest fires and hurricanes, and have also been identified as playing a major role in emergency preparedness plans for nuclear power plants.

Division Of Wildlife Management

The Division of Wildlife Management made progress on several fronts during the 1984-86 biennium. The nongame program began to accomplish some major goals with an expanded staff made possible through the checkoff for the North Carolina Nongame and Endangered Wildlife Fund on state income tax returns. The game lands program also stabilized in terms of total acreage, and the emphasis has turned to quality management of these lands.

Volunteers and cooperators continued to play an important role in the Division's ability to accomplish its objectives. Many sportsmen's organizations, for example, have contributed funds to support wildlife research and restoration, and manpower to improve habitat on game lands. A special word of thanks also goes to the many cooperators who enrolled land in the game lands system, offering opportunities for public hunting and other outdoor recreation.

The following biennial accomplishments are presented for review.

Big Game

White-tailed deer populations in the state continued to grow in numbers and expand in range during the biennium. With the completion of the deer-restoration program, the reported harvest is now over 55,000 deer annually. Seasons are currently available to hunters in all 100 counties of the state, and 65 counties offer some type of either-sex hunting during the gun seasons.

Either-sex deer hunting continues to grow in popularity, and permits were issued to 2,704 hunters to allow the harvest of either-sex deer on 15 game lands during the 1985-86 season. These hunts resulted in a reported harvest of 223 deer. The private lands, antler-less-permit program also continued to expand during the biennium. There were 157 participants involving approximately 950,000 acres in the program during the 1985-86 hunting season, and data on selected herd characteristics were collected from over 10,000 deer.

A deer-research project which examines factors limiting deer distribution and density in selected mountain habitats continued during the past two years. Much valuable information has been collected pertaining to habitat variables and their impacts on deer condition. This information should result in better management of mountain deer herds in the future.

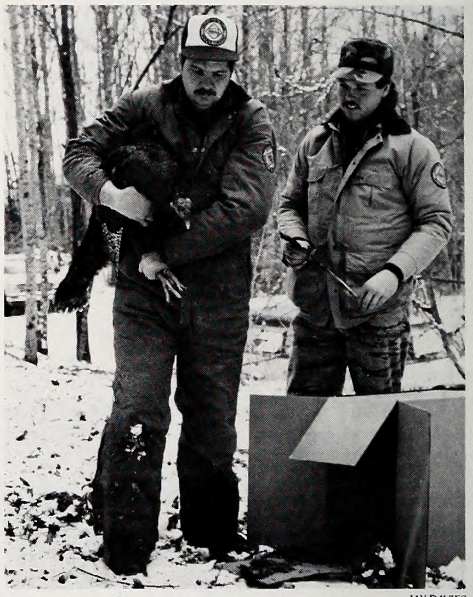
North Carolina's black bear populations are found in the coastal and mountain regions, but no resident population remains in the Piedmont. Harvest data and biological samples are collected from a high percentage of the bears harvested each year. This information helps biologists determine the magnitude of the annual harvest, and the reproductive status and age structure of the population. During this biennium, reproductive status and ages were determined for 91 and 537 bears respectively. This data indicates that the bear population is fairly stable, and road kills and depredation problems indicate that there is a high bear population in northeastern counties which have closed hunting seasons.

Currently, two bear research projects are being conducted in North Carolina in cooperation with the Wildlife Commission. The Pisgah study is being conducted under the direction of N.C. State University, and the Harmon Den study is being conducted under the direction of the University of Tennessee. The Dismal Swamp bear study conducted under the direction of Virginia Polytechnic Institute was recently completed. The results should be available within a year.

Wild boar are found in portions of 10 mountain counties, and during the biennium hunters reported harvesting 206 wild boar to wildlife cooperator agents. Graham County accounted for 67 percent of the reported harvest, and 601 wild boar were relocated from the Great Smoky Mountains National Park to game lands in Graham County.

The state's wild turkey program continued to progress during the biennium. A detailed county-by-county assessment of the status of the wild turkey is conducted every five years, and the 1985 assessment showed that significant progress is being made. The study revealed that 77 of the state's 100 counties have wild turkey populations, and the estimated statewide population is over 14,000 birds. One of the most significant findings was that 3,500 square miles (over 2 million acres) of unoccupied potential habitat still exists, and the restoration effort is far from complete.

Much progress was made in wild turkey restoration during the biennium. Division of Wildlife Management employees live-trapped 248 birds from wild populations, and these birds were transported to release sites throughout the state. This figure represents a record number of birds moved, and includes 37 turkeys obtained from the



JAY DAVIES

***The gobbler above is** one of the 16 released last winter by wildlife management technicians Jerry Anderson (left) and Dowd Bruton on game lands near Franklin. Below, Patricia Mial processes tags for the special, permit-only swan season.*

state of West Virginia in exchange for 20 otters which were used in West Virginia's otter-restoration project. One of the Wildlife Commission's goals is to restore the wild turkey to all of the suitable habitat remaining in North Carolina, and this will remain the primary objective of the wild turkey program.

Two important research projects were begun during the biennium. One is investigating the effects of flooding on the wild turkey population along the Roanoke River, and the other is determining turkeys' use of nesting and brood habitat in the western mountains. This work is being coordinated with N.C. State University and Clemson University respectively. Biologists also conducted two projects to monitor diseases in wild turkeys and to investigate genetic variability among wild turkey populations.

The improving status of the wild turkey is also being monitored by the mandatory tagging and reporting of hunter-harvested spring gobblers. The last several years have seen record harvests. In 1983 the harvest was 351, 1984 - 422, 1985 - 508 and 1986 -537.

Dry springs in 1985 and 1986 were beneficial to the survival of wild turkey poults. Populations are expected to continue to expand over the next biennium, but the big birds still face some problems. Large tracts of quality hardwood or mixed pine and hardwood timber are the favorite habitat of the wild turkey, and much of this type of habitat is in danger—particularly in the Piedmont and Coastal Plain. Forested areas are being converted to other uses, hardwoods are being cut and converted to pure pine stands, and quality bottomland hardwoods are being inundated by large reservoir projects. Couple this with illegal hunting, disease resulting from individuals releasing pen-reared wild turkeys (a violation of North Carolina law) and free ranging dogs, and the wild turkey faces some formidable obstacles in many areas of our state.

However, a land ethic adopted by North Carolina's landowners devoted to preserving valuable wild turkey habitat, coupled with the state's active restoration effort, will ensure the future of this grand game bird for future generations.

JAY DAVIES

***A game lands** work crew (above) builds brush piles for rabbits and prunes fruit trees to improve wildlife habitat on game lands near Waynesville. These crews also maintain game land boundaries, roads, and other facilities.*

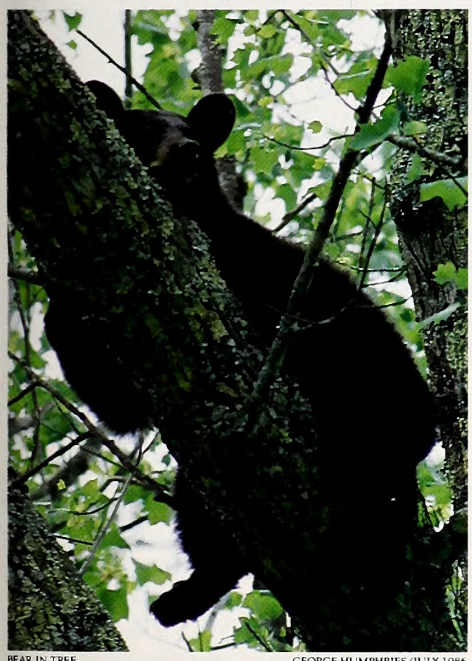
Small Game

Biologists continue to be concerned about the declines in small-game populations, especially quail and rabbit. Recent meetings in North Carolina with leaders from conservation agencies from across the southeast show that the problem is not restricted to North Carolina. In efforts to document the magnitude of the declines, many new population surveys have been designed and initiated and surveys abandoned in the late 1960s and early 1970s have been reestablished. Quail and grouse hunters may have seen fellow hunters in the field last fall wearing bright orange hats signifying that they are Quail or Grouse Hunter Survey Cooperators. These hunters are participating in one of the Commission's studies to help index trends in quail and grouse populations through hunter effort and success. Their cooperation is vitally important to the Commission's program to improve hunting for these two species.

During this biennium, one additional biologist has been reassigned to full-time

JAY DAVIES

Mountain Nongame *Project Leader Allen Boynton (left) and intern Jim Kaiser release six young peregrine falcons at a site in Haywood County. Thirteen birds were released in 1986 as part of the restoration project for these endangered species.*



BEAR IN TREE GEORGE HUMPHRIES/JULY 1986

duties on the small-game project. A big part of his responsibilities is to continue the rabbit habitat and research work being done on the Penny Bend Rabbit Research and Demonstration Area near Butner. A cooperative research project with North Carolina State University on rabbits came to a close this fall, and the Commission is very interested in continuing its rabbit work and applying some of the things we have learned from the past seven years of cottontail research.

In an effort to work with farmers and other landowners interested in developing small-game habitat on their property, biologists have also been working with the N.C. Extension Service and the N.C. Wildlife Federation in developing demonstration areas across the state. These demonstration areas will help show landowners and local conservation leaders how they can improve habitat for small game. In addition, changes have been made in the timing of distribution of our free planting materials. These changes should improve the success of wildlife plantings.

Keep an eye on the roadsides for small-game habitat improvements. Commission biologists have been busy working with the N.C. Department of Transportation in improving their roadside maintenance for wildlife. We think you will see a big improvement in this area over the next few years. Much time has also been spent working with the U.S. Soil Conservation Service and the U.S. Agricultural Stabilization and Conservation Service on the newly enacted federal Farm Bill. This important piece of legislation will have beneficial impacts on wildlife for many years.

Plans for the next biennium will involve a continued emphasis on small-game work. Sources of funding will be sought for expanding the small-game research program and developing the Sandhills Research and Demonstration Area.

Migratory Birds

Among the most significant accomplishments in this area during the past biennium was the development of a comprehensive Canada goose management plan for North Carolina. This plan has focused attention on the plight of the migratory segment of the Canada goose population in the southern portion of the Atlantic flyway. New regulations have been adopted in an attempt to halt the decline in North Carolina's migratory populations of Canada geese. The plan has also caught the attention of the U.S. Fish and Wildlife Service and several other states along the Atlantic Flyway. As a result, we expect more active involvement from these agencies in helping with the problem.

The Commission is also utilizing funds generated by the state's voluntary Waterfowl Conservation stamp and print program to implement its statewide waterfowl management plan. Included in the expenditure of these funds is the partial funding of the purchase of bottomland habitat along the Roanoke River. These areas are vitally important as brood rearing and wintering habitat for many species of waterfowl. Generations of waterfowlers will benefit from the protection of this dwindling habitat type. Other expenditures from the waterfowl stamp program include funding of a waterfowl habitat specialist position and the purchase of a micro-computer to aid biologists in evaluating and organizing the complex data needed to adequately monitor waterfowl populations.

North Carolina held its first swan season since 1918 during this biennium. North Carolina biologists have been working through the Atlantic Flyway Council for a number of years to justify and design a season that would allow sportsmen the opportunity to utilize this resources, and at the same time assure that swan populations are maintained at a safe level. North Carolina

Division Of Wildlife Management

was the first state in the flyway to initiate a swan season, but judging from the popularity of our season other states will soon follow.

Early seasons to allow increased harvest of North Carolina raised wood ducks has been another popular season with our sportsmen. Banding efforts by state biologists in the late 1970s convinced the U.S. Fish and Wildlife Service to allow the more liberal early season. Population declines, possibly due to severe drought conditions, seem to have occurred during the past couple of years, however. Biologists during the next biennium will be placing considerable emphasis on the careful management of this important species.

Furbearers

As directed by the legislature, the Commission has been working toward improving its ability to monitor furbearer populations in the state. Three full-time biologists are involved with scent-station surveys, stream surveys, and fur-dealer contacts. In addition, they are actively involved in working with raccoon clubs to improve and preserve their sport in areas having high hunting pressure in the western part of the state.

North Carolina's growing beaver population has played a large part in the furbearer program in the last few years. Despised by some and loved by others, the beaver has kept furbearer biologists busy trying to solve landowner problems and, at the same time, trying to avoid elimination of the beaver in areas where the animals are beneficial.

A beaver task force, composed of representatives from various land management agencies, farm organizations, and interested landowners was recently formed to develop strategies for managing beaver populations. Task force recommendations include expanding public information efforts which stress the beneficial aspects of beavers and how they may be managed. A new concept called the Beaver Pond Clearinghouse was also developed by the task force, and will be administered by county agents of the North Carolina Agricultural Extension Service. County agents will maintain lists of landowners who wish to lease hunting rights to beaver ponds and sportsmen seeking hunting leases. In addition, the task force recommended that workshops on beaver management be conducted in areas where landowners need assistance. As an additional aid to landowners, a booklet entitled *Beaver Management In North Carolina* will soon be published. As beaver populations continue to grow in the future, however, both the benefits and problems associated with this unique animal will increase.

BARN OWLS TERRY SHANKLE/DECEMBER 1985

The river otter is another furbearer which is of special interest to biologists. Recent surveys by biologists in each of the Wildlife Commission's nine districts has yielded new information on the range and distribution of otters. In western counties where otter populations are suspected but not confirmed, biologists will begin a stream-by-stream search for otters.

Nongame

In only its first full biennium of funding through the state income tax checkoff, the Nongame and Endangered Wildlife Program has already begun to expand and diversify. Public support has generated a funding increase from $230,000 in 1984 (the first year of the tax checkoff) to $306,000 in 1985, and the 1986 receipts are expected to top $330,000. As a result of this public support, the Commission has been able to add several new projects to its nongame program. By policy, the Commission spends 100 percent of contributions to the N.C. Nongame and Endangered Wildlife Fund on projects for nongame species.

Major emphasis during the past biennium continued to be directed at bald eagles, peregrine falcons, sea turtles, and Project WILD. New projects initiated since 1984 focus on the Virginia big-eared bat,

TERRY SHANKLE

***Canada geese are** banded with special collars (above) as part of a larger study at the Hagar Stone Park in Guilford County. The study is yielding new information on the habits, migrations, and survival rates of North Carolina Canada geese.*

northern flying squirrel, Tar River spiny mussel, and colonial waterbirds. Also, the Nongame and Endangered Wildlife Fund helped provide part of the funding to purchase threatened Roanoke River bottomland hardwood habitats supporting several heronries and a host of nongame species.

A total of 19 bald eagles have been released at the Lake Mattamuskeet National Wildlife Refuge in Hude County since this reintroduction project was initiated in 1983. The objective of this project is to reestablish a breeding population of at least 10 nesting pairs of bald eagles in North Carolina. Also, two natural bald eagle nests have been located by Commission nongame biologists, and during the past two years these nests have produced 10 young wild eagles. These are the first known successful nests in the state since 1971.

The biggest surprise so far for nongame biologists was the development of a major bald eagle summer roost on the Jordan Lake project near Raleigh in 1985. At least 42 bald eagles used the area that summer, and as many as 51 were counted on Jordan and Falls lakes in the summer of 1986. In order to determine the sensitivity of these eagles to disturbance, and to develop appropriate management plans for the lakes, the Commission is cooperating with the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service in a major research project on the summering bald eagle population.

A total of 27 peregrine falcons have been released in the mountains of western North Carolina since this project began in 1984. A "tiercel" or juvenile bird released from Grandfather Mountain in 1984 returned to the area the following year, and in 1986 was observed repeatedly with a female in the Linville Gorge area. There have been no known peregrine nestings in North Carolina since 1957, and the observance of a pair of these endangered raptors demonstrating mating behavior is hopefully a precursor to a major success story.

Sea turtle nest protection activities and development of the aquatic supplement to Project WILD were continued during the past biennium.

New research and survey projects for the endangered Virginia big-eared bat, northern flying squirrel and Tar River spiny mussel

Division Of Wildlife Management

were initiated in 1986. The nongame program received federal Endangered Species Act Section 6 funds to assist with the costs of these projects. Field work began in 1986, and the results will be reported in full when the projects are completed.

Development of a colonial waterbird-management plan was initiated in 1985, and the draft plan is being used to protect islands supporting high concentrations of nesting waterbirds such as terns and brown pelicans. This project addresses a complex problem requiring coordination and cooperation between the Wildlife Commission, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, National Park Service, State Parks, Marine Fisheries, Coastal Management, and the National Audubon Society.

Land Management

The Land Management Section's primary responsibility is to improve wildlife habitat across the state. For example, the Section administers the game lands program, assists private landowners with habitat-development needs, and conducts a forest-management program on state-owned lands.

Improving wildlife habitat on private lands is a continuing challenge. The Commission's nine district biologists are responsible for this program. Since there are over 225,000 landowners statewide, these biologists have discovered the necessity of working closely with professionals from other conservation agencies to effectively assist these owners. The interagency approach results in the need to coordinate with forestry, soils and agricultural extension specialists to address wildlife and other conservation needs in each county. Cooperative planning greatly expands opportunities for quality wildlife management on private lands throughout the state.

Habitat improvement efforts resulted in technical guidance to 3,200 landowners and the distribution of 68,000 units of wildlife planting materials to 13,000 cooperators. This seed was processed at the Commission's seed-processing center near Hoffman, North Carolina. Over 20 varieties of seed are mixed, bagged and distributed to each of the nine wildlife districts annually. During the biennium, production approached 400,00 pounds.

TERRY SHANKLE

MIKE OVERTON

***Quail hunting** (above) is a Tar Heel tradition, and biologists are studying the decline in quail populations. Producing ethical and safe hunters is another goal, and this youngster (right) gets an introduction to the sport at a Commission-sponsored youth shoot.*

The game-lands program continues to be of vital importance in providing public access to good hunting areas across the state. During the biennium, approximately 1,850,000 acres of game lands were available to sportsmen as part of this program. Cooperators include state and federal agencies, corporations, and private landowners. Sportsmen purchased 304,437 game lands licenses during the biennium, which is a record for any two-year period since the program began in 1971.

Thirteen mobile wildlife management crews are responsible for habitat management on these areas. They are supervised by a staff of eight wildlife biologists. Four professional foresters are also part of the game lands work force. Together, these employees conduct wide-ranging habitat activities such as prescribed burning and managing over 20 waterfowl impoundments.

GREEN SNAKE KERRY GIVENS/JULY 1986

Accomplishments during the period include maintenance of 350 miles of roads, planting and maintenance of almost 5,000 acres of food plots, and the maintenance of 1,290 miles of boundary line.

The forest-management program is conducted on state-owned game lands by four wildlife foresters with assistance from crews of technicians. During the biennium, $641,708 in revenues were received from the sale of timber. These funds are used to support habitat projects and other program requirements. The forestry program is also used as an opportunity to demonstrate beneficial timber-wildlife practices. Groups of landowners and students frequently request tours of the Caswell and Sandhills game lands to view results of this program.

The overall program will greatly benefit from the recent addition of a waterfowl habitat specialist position. This biologist will provide guidance to landowners interested in waterfowl habitat management, and will handle a variety of duties including the MARSH program. MARSH is an acronym for Matching Aid to Restore State's Habitat, and is funded by Ducks Unlimited.

Land acquisition efforts have also been successful, resulting in the purchase of some valuable wetlands in eastern North Carolina. Utilizing state, private and federal funding sources, the Commission recently purchased 14,000 acres of wetlands along the Roanoke River. This acquisition includes seven tracts in Bertie, Halifax and Martin counties, and will effectively preserve some of the most productive wetlands in the state. ⊠

Division Of Boating and Inland Fisheries

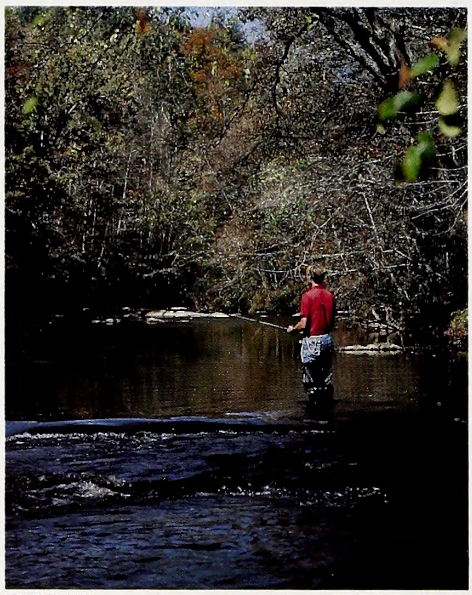
North Carolinians love to fish, and fortunately our state is blessed with a multitude and variety of water resources. In fact, a recent survey of leisure activities ranked fishing as second only to swimming as the most enjoyed activity in the state.

The Division of Boating and Inland Fisheries is responsible for the maintenance and development of a statewide boating facilities program and for the conservation of fisheries resources in inland waters. To meet these responsibilities, Division personnel design, construct, and maintain boating access areas; maintain a waterway marking system; conduct surveys of fish populations; operate four fish hatcheries; develop and evaluate fishing regulations; improve habitat; work with landowners and sportsmen's groups; and review environmental impact statements.

In the western part of the state, much of the Division's efforts are directed toward such cold and coolwater fishes as trout, walleye, muskellunge, and smallmouth bass. This region contains over 4,000 miles of trout water and approximately 50,000 acres of impounded water. Thirty-four boating access areas are maintained by the Division to facilitate the enjoyment of these waters by boaters.

In the Piedmont, activities are focused on reservoirs, ponds, warmwater streams, and rivers. The primary sport fishes found in the Piedmont are striped bass, hybrid striped bass, largemouth bass, catfish, bream and crappie. Over 200,000 acres of impounded water are located in the Piedmont region. These impoundments, combined with six major river chains, provide numerous angling opportunities. Boating and angling opportunities are further enhanced by the presence of 46 public boating access areas.

Warmwater streams and rivers provide most of the freshwater fishing opportunities to anglers in the Coastal Plain. Fifteen major river systems flow into estuaries or directly into the Atlantic Ocean. Many estuaries offer excellent fishing for both fresh and brackish water fishes. Over 75,000 acres of impounded and natural lakes also provide good fishing. This abundance of water is reflected by the 68 boating access areas the Division maintains within the Coastal Plain. Fish primarily sought include striped bass, largemouth bass, crappie, bream, catfish and white perch.



TROUT FISHING KEN TAYLOR / APRIL 1986

Fisheries Management

Fish Kills

The Wildlife Resources Commission is responsible for determining the magnitude and extent of fish kills occurring in public waters. The N.C. Division of Environmental Management is responsible for determining the cause of fish kills, and taking legal action if appropriate.

During the biennium, the Commission investigated 51 major and 96 minor fish kills. Fish replacement costs for the major kills totaled $8,277.09. A total of 993 man-hours were spent investigating all fish kills, and the cost of these investigations was $13,536.69.

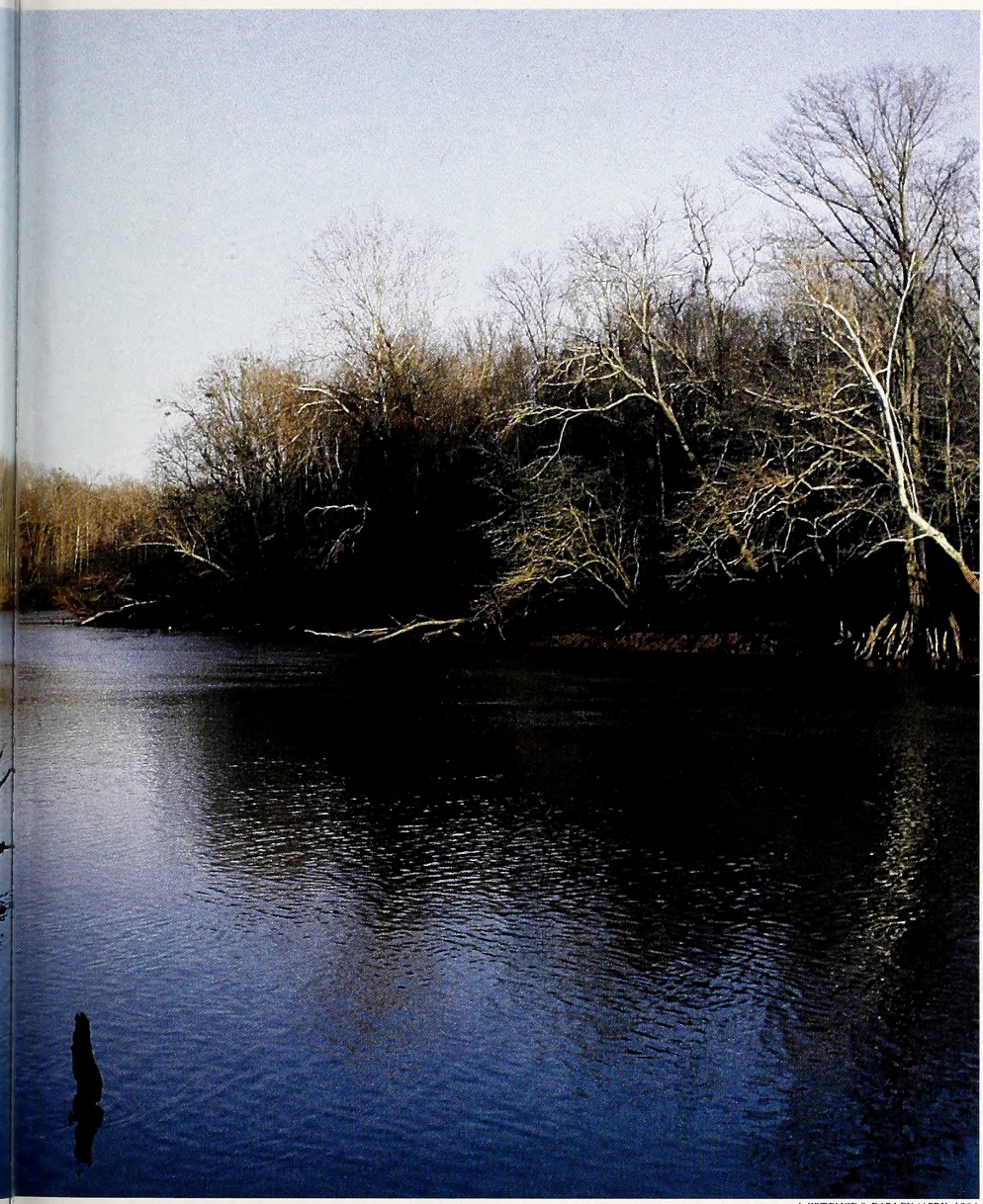
Triploid Grass Carp

North Carolina has nearly 79,000 ponds and reservoirs of one-half acre or larger. Many of these waters contain excessive amounts of aquatic vegetation which restrict fishing, boating, swimming, irrigation, and other uses. One new biological method being used to combat excessive vegetation is the stocking of sterile grass carp.

Grass carp have been used experimentally in some states since 1963 to control aquatic weeds. However, the fish was outlawed in many states, including North Carolina, because of their ability to reproduce and eliminate useful, native plants. A sterile strain of grass carp, called triploid grass carp, was recently developed. These genetically sterile fish are not able to reproduce, but they still control most submerged weeds with delicate stems. They are especially effective in the control of hydrilla.

ROANOKE RIVER

In 1985, the N.C. Wildlife Resources Commission authorized the use of triploid grass carp for individual pond owners who obtain a special permit. During the biennium, 523 permits were issued by the Division of Boating and Inland Fisheries and approximately 10,200 triploid grass carp were authorized for stocking into approved waters. The triploid grass carp offer pond owners an excellent alternative to chemicals for controlling many types of nuisance vegetation.



LAWRENCE S. EARLEY/APRIL 1986

Striped Bass and Hybrids

Striped bass and striped bass/white bass hybrids are stocked regularly into several reservoirs to provide additional sport-fishing opportunities for North Carolina anglers. The striped bass are reared at the U.S. Fish and Wildlife Service's McKinney Lake National Fish Hatchery located in Hoffman, North Carolina. In 1985, hybrids were provided by Georgia's Richmond Hill State Fish Hatchery and the Pamlico Estuary Laboratory operated by the North Carolina Sea Grant program. In 1986, hybrids were produced at the Wildlife Resources Commission's production station at Weldon and were reared to stocking size at the Fayetteville Fish Hatchery.

Approximately 488,000 striped bass fingerlings were stocked in 1985 and 313,000 stocked in 1986. Reservoirs receiving fish were Rhodhiss, Hickory, Lookout Shoals, Norman, Mountain Island, High Rock, Tuckertown, Badin, Tillery, Blewett Falls, Gaston and Roanoke Rapids.

Approximately 88,000 striped bass/white bass hybrids were stocked into North Carolina waters in 1985, and 249,000 were stocked in 1986. Waters receiving hybrids include W. Kerr Scott, Jordan, Thom-A-Lex, Oak Hollow, Townsend, Salem and Greenfield.

Trout

Trout fishing in North Carolina's mountain streams and lakes is among the finest in the Southeast. Over 2,000 miles of streams are designated as public mountain-trout waters. These waters are managed under two categories, native and general trout waters.

Native trout waters are an important part of North Carolina's mountain trout fishery. Stream-reared or "native" brook, brown, and rainbow trout populations are found throughout the mountain region. These populations are maintained through natural reproduction, and depend on high-quality stream habitat for survival. Native trout populations are protected by restrictive regulations on creel limits, length limits, and fishing tackle. Portions of three of the state's most productive streams—Davidson River, South Toe River, and Lost Cove Creek—are designated as "special native" trout waters, and offer superb fishing under more restrictive regulations.

During the biennium, emphasis was placed on protecting and enhancing the State's wild-trout resources. Through cooperative efforts with the U.S. Forest Service, local agencies, and sportsmen's groups, Wildlife Commission fishery biologists worked to ensure that our valuable trout resources were adequately protected in the face of increasing development and habitat deterioration in the mountains.

The Wildlife Resources Commission catchable-trout stocking program continued to provide trout-fishing opportunities in suitable streams and lakes lacking self-sustaining trout populations. During the biennium, an average of 587,303 catchable-sized trout were stocked each year. The average size of trout stocked increased significantly in the last two years. This "big fish" program has maintained three percent of stocked trout greater than 10 inches, and one percent of stocked trout greater than 14 inches in length. The quality of the stocked fishery has been enhanced further through better distribution of fish in receiving waters.

Additional stockings of fingerling trout were made in streams where natural reproduction of trout is limited. Fingerling stockings supplement the native trout population and provide for increased fishing

Division Of Boating And Inland Fisheries

HORSEPASTURE RIVER FALLS

ALAN EAKES/FEBRUARY 1985

opportunities. Approximately 43,000 fingerling trout were stocked in 1985, and an additional 3,700 fingerlings were stocked in 1986. More fingerlings were stocked in 1985 because the severe winter of 1983-84 limited trout reproduction in many areas. Many fingerling stockings were carried out with the assistance of local sportsmen's groups.

Coastal Striped Bass

The Roanoke River-Albemarle Sound striped bass population is continuing to decline. A significant year class has not been produced by this population in over 10 years. As a result, the sport fishery for this species has dwindled.

The Division of Boating and Inland Fisheries is cooperating with the Division of Marine Fisheries and East Carolina University in conducting extensive research to determine the causes of this decline. Reproductive failures, possibly caused by starvation of larvae, are believed to be one cause. Striped bass larvae have been collected from the Roanoke River delta and the nursery area in western Albemarle Sound to determine abundance, time and location of initial feeding, and feeding success. Forage availability for larvae and the impacts of varying river flows on all of these factors have also been measured.

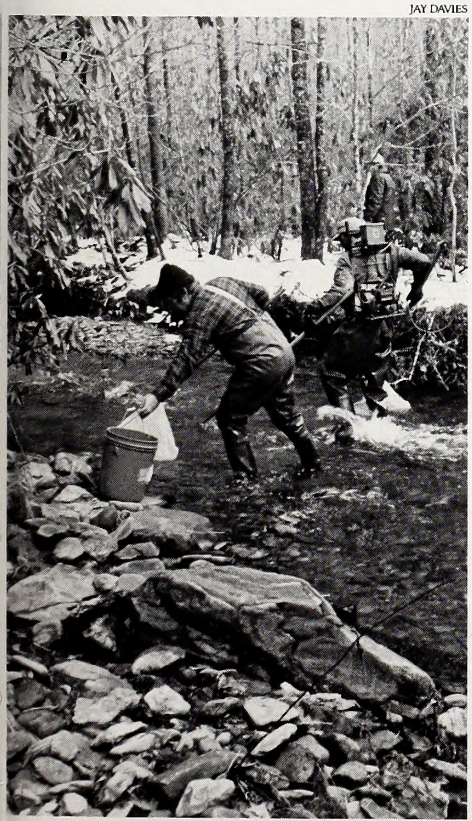
We have determined that forage abundance is lower than that observed in other striped bass nursery areas around the country. Also, river flows have a profound influence on larvae abundance, initial feeding, and forage availability. Body tissues of fed and starved striped bass larvae were examined and compared with larvae from the Roanoke River to determine their nutritional state.

Recent studies have indicated that adult striped bass forced to remain in water warmer than 76°F during the summer months experience poor reproductive success. Water temperatures and dissolved-oxygen levels are being measured during the summer in Albemarle Sound to determine if they are related to reproductive failures.

If the factors responsible for low reproductive success of Albemarle Sound striped bass are identified and can be corrected, sufficient brood fish must be available in the population to take advantage of the improved conditions. In order to protect the remaining potential spawners, the Commission has reduced the daily creel limit to three fish.

Striped bass fingerlings are being produced and stocked into Albemarle Sound through a cooperative project with

TERRY SHANKLE



JAY DAVIES

The opening *of the trout season is big news, and District 7 Fisheries Biologist Joe Mickey (above) is interviewed by a television news team on the outlook for the season. Several months earlier (left) fisheries worker Jerry Hodge collects rainbow trout eggs from the Nantahala River and its tributaries as Paul Pittman electro-fishes the water.*

the Division of Marine Fisheries and the U.S. Fish and Wildlife Service. This project is designed to supplement natural reproduction until such time as natural reproduction is restored to adequate levels. During the biennium, 280,000 striped bass were stocked into Albemarle Sound.

Threadfin Shad

Threadfin shad, native to waters from Florida to Texas, were first introduced in North Carolina during 1957. The introduction was made to capitalize on the fish's reproductive capability. Since threadfin spawn two to three times per year in most of our reservoirs, they provide an excellent forage base for such game species as largemouth bass, crappie, smallmouth bass, white bass and walleye.

Adult threadfin are collected each spring from the tailrace of Mountain Island Reservoir and transferred to selected reservoirs. Since threadfin "winterkill" when water temperatures drop below 45°F for extended periods, annual restockings are necessary in most reservoirs. For unknown reasons, the shad failed to appear at Mountain Island Reservoir in 1985 and Commission personnel obtained 5,000 shad from Alabama. In 1986, a total of 99,390 shad were collected from the Mountain Island tailrace and stocked in selected reservoirs.

Muskellunge

Evaluation of muskellunge habitat, growth rates and natural reproduction, and the contributions of stocked muskie to population numbers were carried out during the biennium on the French Broad, New and Nolichucky rivers. Researchers determined that natural reproduction is occurring, stocking rates are high when compared to available habitat, and that growth rates compare favorably with muskellunge populations elsewhere.

An angler diary program which uses information collected by muskie fishermen was instituted on the three rivers to measure fishing success. This program will also provide additional information on the contribution of stocked fish to muskie fisheries.

We continued to refine techniques at the Table Rock hatchery for rearing muskellunge on pelletized feed. This process has shown promise in North Carolina, and should reduce the number of ponds needed to rear forage for muskellunge.

Flathead Catfish

Catches of flatheads totaling 200 pounds are not uncommon in North Carolina, and anglers have caught flatheads weighing between 50 and 60 pounds on several occasions. During the biennium, two projects involving flathead catfish were developed.

The first, a follow-up project on feeding habits of flathead catfish in the Cape Fear River, was designed to determine the impact

Division Of Boating And Inland Fisheries

flatheads are having on other resident fishes. Food preferences of flathead catfish are being determined and compared to similar data from other studies.

The second project will determine the presence or absence of flatheads above dams located on the Yadkin and South Yadkin rivers. This information will allow us to make decisions concerning the management of catfish in these rivers, and to determine the need for additional stockings.

Black Bass

During the biennium, a major activity in our bass-management program was the evaluation of the statewide size and creel limits that were established in 1982. The regulations placed a minimum-size limit of either 12 or 14 inches (dependent upon species and area of the state) on black bass. However, two fish less than the specified minimum length could be retained in the daily creel. We anticipated that this limit would increase the numbers of mid-sized bass in many waters while allowing a limited harvest of the smaller bass.

Results of this evaluation demonstrated that allowing anglers to harvest up to two small bass during a day's fishing did not affect the numbers of adult bass. Many of these smaller fish die of natural causes, and would not have grown to adult size had they not been harvested. However, restrictions on the harvest of 12-to 14-inch fish was not enough to yield greater numbers of mid-sized bass. We concluded that the regulation is appropriate for statewide application, but that more restrictive regulations would be needed to manage specific waters for larger bass.

The Division also monitored the development of bass populations in the recently impounded Falls-of-the-Neuse and B. Everett Jordan reservoirs. Populations of adult fish at both lakes have been very good. However, a spring shoreline electrofishing sample at Jordan Lake conducted in 1986 confirmed that bass reproduction in the lake had been poor for two successive years. Efforts to understand why this problem has occurred, and to recommend a corrective response, are underway. The fishery staff at N.C. State University is joining the Wildlife Resources Commission in a cooperative investigation at Jordan Reservoir.

Division of Boating and Inland Fisheries Stocking Program

Warmwater Fishes Stocked

Species	1985	1986	Total
Channel Catfish	43,658	97,778	141,436
Threadfin shad	4,834	99,390	104,224
Striped bass	487,919	313,418	801,337
Striped bass hybrid	198,283	248,995	447,278
Largemouth bass	121,978	30,630	152,608
Bluegill	97,609	82,625	180,234
Redear sunfish	82,638	86,125	168,763
Redbreast sunfish	32,368	—	32,368
White perch	—	36,000	36,000
Green sunfish hybrid	4,389	25,000	29,389

Coolwater Fishes Stocked

Species	1985	1986	Total
Walleye	1,861,215	31,297	1,892,512
Smallmouth bass	20,584	—	20,584
Muskie	4,027	1,200	5,227

Trout Stocked

Species	1985	1986	Total
Brook	91,756	29,296	121,052
Brown	204,581	85,937	290,518
Rainbow	437,332	373,260	810,592

KEN TAYLOR

MARK TAYLOR

***Muskie** (left) now afford fine sport in the French Broad and a handful of other mountain rivers. The cleanup of our waters made the restoration of this fine game fish possible. Al Simpson samples phytoplankton (above) as part of striped bass study.*

Habitat Conservation

North Carolina's fisheries habitat is subjected to a variety of environmental stresses related mainly to how land is used both by the public and private sectors. It is the responsibility of the Wildlife Resources Commission's Division of Boating and Inland Fisheries to ensure adequate protection and enhancement of our aquatic resources for future use. This is accomplished through the review of permits and environmental impact statements which can lead to mitigation of fishery losses or, in some cases, protection of an existing resource from severe damage. During the biennium, fisheries personnel were involved in environmental assessments of 644 projects. The number of assessments declined approximately seven percent from the previous biennium. However, technical service demands in this area will probably increase during the next biennium because of increased development and North Carolina's growing population.

Another service provided is management advice to pond owners. During the biennium, the Division provided technical assistance to 1,441 pond owners throughout the state. This was an increase of 31 percent over the past biennium. During the biennium, the fisheries management program for private ponds has undergone major changes. The change which has had the greatest impact upon the Commission and pond owners was the elimination of free fish stockings by the U.S. Fish and Wildlife Service after 1986. Because of this action, the Wildlife Resources Commission developed a plan for the orderly transition of the pond-fishery program from federal to state administration. An interagency committee was assigned the task of recommending the best approach without limiting basic services.

This committee recommended continuation of the assistance program to pond owners, but fish for stocking private ponds would have to be procured from private sources. Commission fish hatcheries are committed to production of fish for management stockings of public waters, and cannot meet the demands of the private sector. However, the Wildlife Resources Commission will provide to pond owners upon request a listing of licensed fish producers who have met specific standards defined by the Commission. The committee also suggested the Commission develop a pond-management guidebook for use by pond owners which should discuss strategies for fishery-management and stocking schemes. Development of this guidebook was initiated in 1986.

The Habitat Conservation Program, recently brought into the Division of Inland Fisheries, is responsible for the conservation of the state's fish and wildlife resources by preventing or minimizing the habitat loss and degradation that is all too often a by-product of development. The pressures facing our wildlife resources and their habitats are many. For example, huge land-clearing and draining projects in the East, reservoir construction for water supply and hydroelectric power, and the construction

Division Of Boating And Inland Fisheries

of new highways and wastewater treatment plants have the potential for destroying thousands of acres of wildlife habitat.

These projects and many others are reviewed in the planning stage by personnel in the Habitat Conservation Program. As required by state and federal law, the program assesses the impacts that projects would have on fish and wildlife habitats and develops recommendations to reduce or eliminate the damages to wildlife. In cases where wildlife habitats will be lost, "mitigation" measures—such as preserving forestland in the game lands system in exchange for the habitat lost in construction of a reservoir—may be required for permit approval.

During the 1984-86 biennium the Habitat Conservation Program was involved in coordination efforts with the N.C. Department of Natural Resources and Community Development and the U.S. Army Corps of Engineers in a proposed peat mining project. First Colony Farms Inc. proposed to mine 15,000 acres of peat in Washington and Tyrrell counties to provide fuel for the generation of electricity. Negotiations on this project resulted in the formulation of peat-mining regulations which include rigorous land-reclamation requirements in addition to measures to protect fish and wildlife resources from mining.

The Wildlife Resources Commission also helped the Department of Natural Resources and Community Development develop a document entitled "Instream Flow Policy and Instream Flow Criteria" that was recently published. This document may require strengthening through time and use, but it is an important first step towards developing legally sanctioned minimum flows for protection of fish and wildlife resources. Instream flow recommendations were developed for the Falls-of-the-Neuse Reservoir near Raleigh. These guidelines provide for adequate instream flows in the Neuse River below the dam throughout the year, and maintenance of stable water levels in the reservoir during the spawning season for largemouth bass.

Another important instream flow case involved the Nantahala Power and Light Company and the Horsepasture River. Habitat Conservation Program personnel have helped develop studies to determine minimum flow requirements for streams associated with Nantahala Power and Light projects. These studies will provide data necessary for partial recovery of trout stream fisheries that have been severely degraded for over 40 years. Program personnel also joined investigations into a hydroelectric power project proposed for the Horsepasture River, a mountain stream with a spectacular series of waterfalls. The investigation ultimately led to the Horsepasture River's designation as a State Natural and Scenic River and to proposed status as a National Wild and Scenic River.

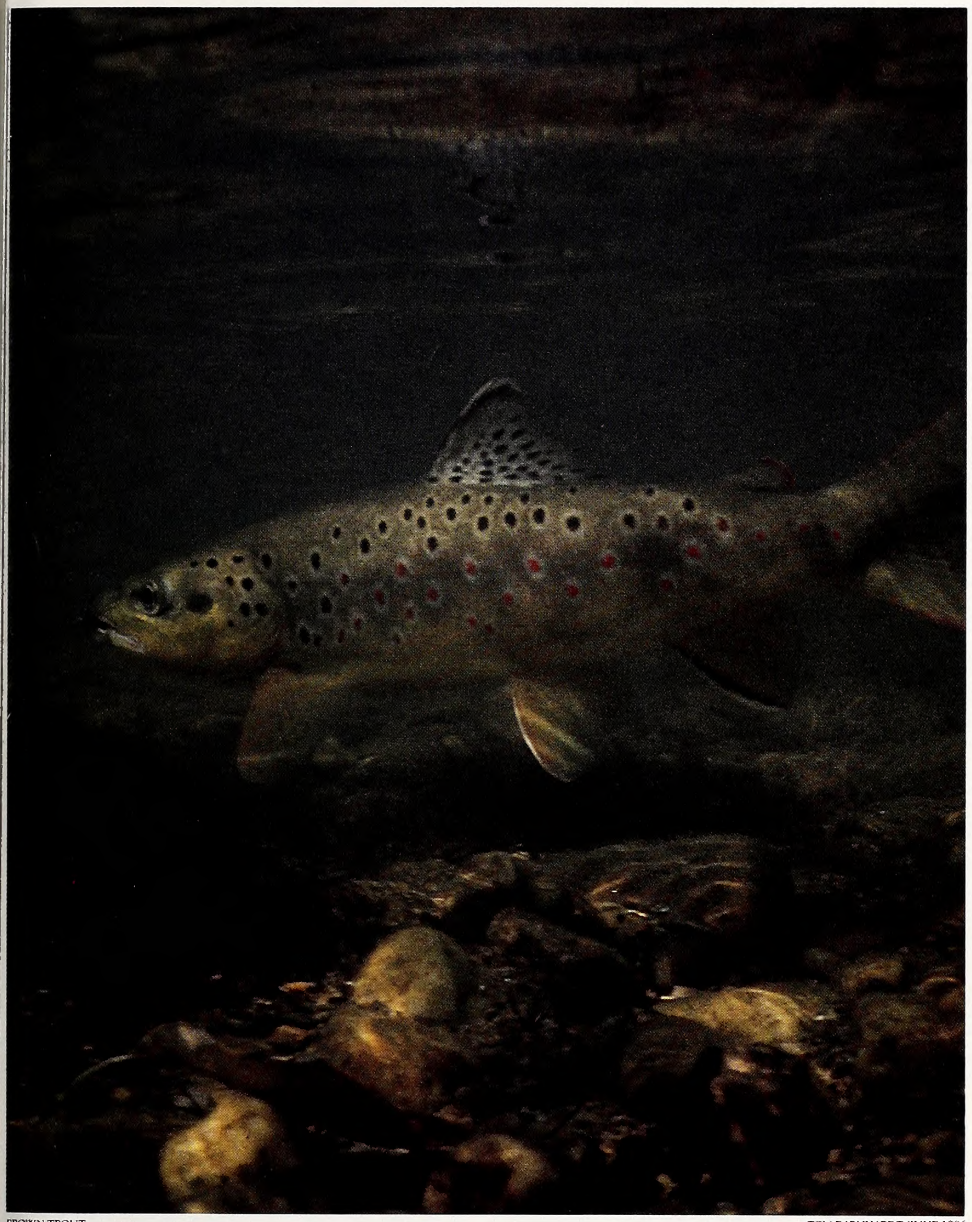
In cooperation with the U.S. Fish and Wildlife Service and the N.C. Department of Transportation, Habitat Conservation personnel assisted in developing a "mitigation bank" which consists of an 800-acre area of prime bottomland hardwood forest in the Roanoke River floodplain. In situations where adverse impacts on wildlife habitats from Department of Transportation projects cannot be avoided or otherwise mitigated, portions of this tract of land can be "withdrawn" or donated to the Wildlife Resources Commission as mitigation for these unavoidable impacts.

The Program sponsored a study conducted by N.C. State University to determine the feasibility of using satellite imagery to develop a statewide inventory of wildlife habitat. As part of this study, a pilot project involving over one million acres of

LARGEMOUTH BASS KEN TAYLOR/JULY 1985

***Crappie fishing is** popular throughout the state, and biologists are studying crappie populations to determine if regulations may be needed. Below, fisheries Biologists Roger Jones and Shari Ann Lunardini use a trap net to assess the crappie population in Falls-of-the-Neuse Lake near Raleigh.*

KEN TAYLOR



BROWN TROUT TOM EARNHARDT/JUNE 1986

Projects Reviewed

	Number of Permits Reviewed	Recommended for Modification or Permit Denial
Hydro-Power & Water Supply	111	111
State Permits for Coastal Dredge & Fill	564	268
Renewals for State Permits for Coastal Dredge & Fill	44	3
Airport Construction Expansion	18	0
Wastewater Treatment Plant Construction	66	11
Highway Construction	160	50
Environmental Impact Statements	265	64
Wastewater Discharge (401 Certification)	6	0
Dam Construction	93	7
Corps Permits for Construction in Wetlands	142	63
Land Use	13	0
Total	1,482	577

land in the southeastern portion of the state was completed. The evaluation showed that the process is not yet sufficiently accurate for usable wildlife habitat mapping. However, newer and more expensive techniques have already been developed that may warrant further investigation when costs decrease in the future.

Boating Facilities Program

During the 1984-86 biennium, four new access areas were added to the statewide system. Three of these new areas, Sans Souci Ferry located on the Cashie River in Bertie County, West Onslow Beach located on the Intracoastal Waterway in Onslow County and Sunset Harbor located on the Intracoastal Waterway in Brunswick County, were built by the Wildlife Resources Commission. The fourth area located on Lake Hickory in Alexander County was added through a lease agreement with Duke Power Company. These additions bring to 148 the total number of public-access areas maintained by the Wildlife Resources Commission.

Major renovations were completed on several areas. These included installation of two new ramps at the Taylor's Creek area in Beaufort County, reconstruction of approximately 300 feet of bulkhead at the Stumpy Point area in Dare County, renovation of the Williamston area on the Roanoke River in Martin County, replacement of the lower section of the ramps at the Summit area on Gaston Lake in Halifax County and the Falkland area on the Tar River in Pitt County, and the addition of approximately 200 feet of ramp to the Rocky Branch area on Nantahala Lake in Macon County. Other major maintenance work included the dredging of silt from the ramp area and channel at North Fork area on Lake James in McDowell County, Thelma area on Roanoke Rapids Lake in Halifax County, and the Old Sparta area in Edgecombe County.

Approximately 700 navigational buoys were maintained on inland waters across the state. These buoys serve as navigational aids to boaters by identifying channels, hazardous obstructions, congested areas, and no-wake zones. ⊠

Division Of Conservation Education

The goal of the Division of Conservation Education is to foster in the public a better understanding of the need for conservation and sound management of our wildlife and related natural resources. Without a strong conservation ethic, the health of our wildlife resources and natural environment will continue to decline as the human population of North Carolina grows.

The tools being used to help create this ethic are many,and include publications and exhibits, movies, television, radio and newspaper coverage, conservation-education programs in schools, and youth programs.

To accomplish this work, the Division is divided into the Publications, Audio-Visual, and Educational Services sections.

Publications Section

Wildlife In North Carolina magazine is the most visible product of the Division of Conservation Education, yet the Publications Section also produces brochures and other miscellaneous publications, exhibits, and provides news coverage for state newspapers.

Much of the work involved in the production of miscellaneous publications falls on the Section's Art Department. Composed of an art director, two artists, and a typesetter, this department produced 150 to 200 special projects each year of the biennium in addition to doing much of the artwork and all of the layout and typesetting for *Wildlife In North Carolina* magazine. Special publications range from large projects, such as the production of the annual North Carolina Wildlife Calendar and the annual fishing, hunting, and trapping regulations digest, to brochures publicizing the Wildlife Endowment Fund and land-acquisition projects such as the purchase of Conine Island. Routine work involves type-setting copy for Commission exhibits and signs. In addition, the Section does the artwork and layout for the *Carolina Notebook*, a four-page conservation-education primer for teachers which is published six times per year, and a quarterly *CATCH (Carolina Anglers Teach Children How) Newsletter.*

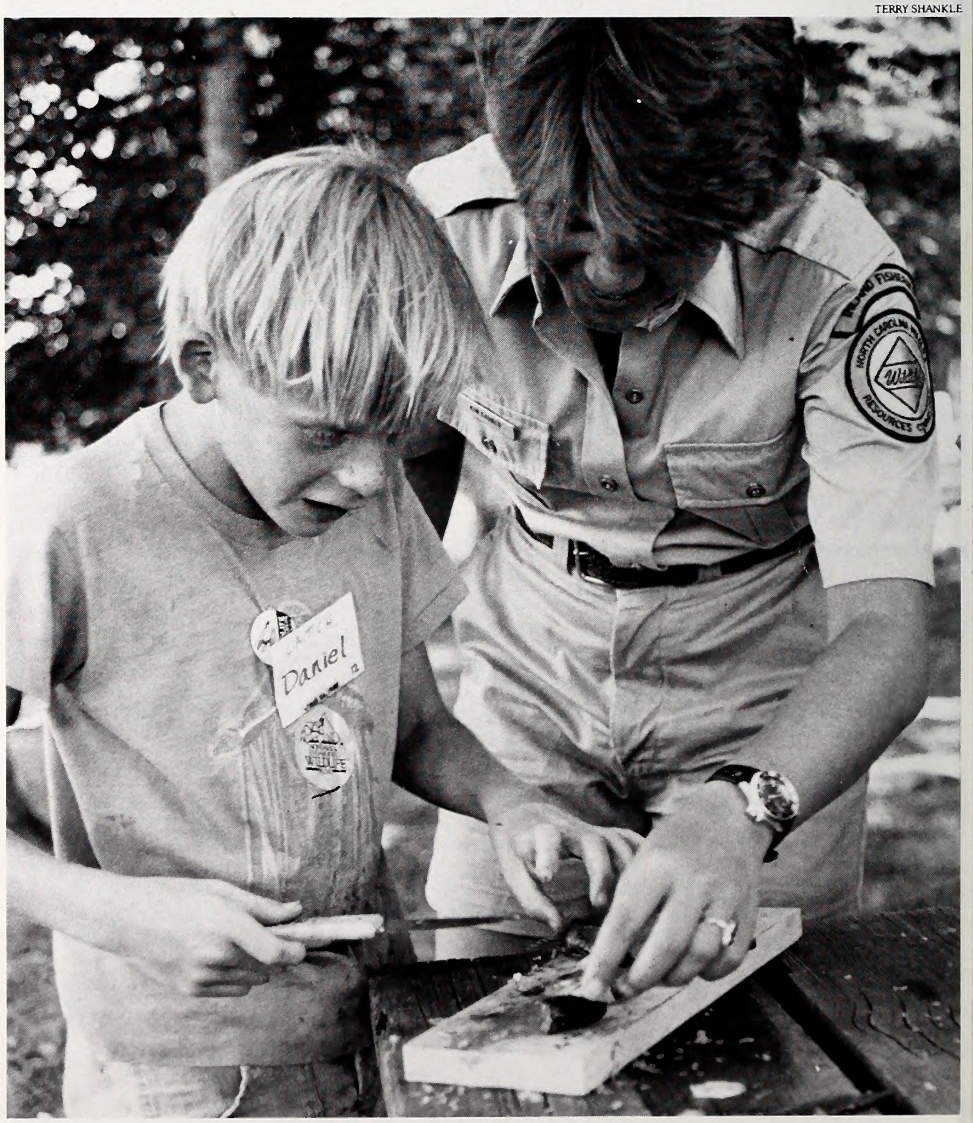
All of the copy for these publications is written or edited by the three editors in the Publications Section.

Another major role of the Publications Section is to provide news coverage for the Commission. The *Wildlife Newsletter* is a six to eight-page news package mailed every

DEBBIE CONGER

TERRY SHANKLE

Cleaning what you catch *is one of the delights of the CATCH (Carolina Anglers Teach Children How) fishing clinics, and Kim Garner (below) heads this program and helps out as an instructor. Anne Poole (standing) and Debra Sutton handle a heavy secretarial load for the 19 other Division employees.*



YOUTH CLINIC

CURTIS WOOTEN/OCTOBER 1984

DEBBIE CONGER

***The Art Department** within the Division handles some 200 projects a year, the most visible being* Wildlife In North Carolina *magazine and the* Wildlife Calendar. *Donnie Robbins (left) and Jodi Betts select photos for a layout.*

two weeks to all of the newspapers, radio and television stations, outdoor writers, and sportsmen's and conservation groups in the state. It gets excellent use across the state. The *Newsletter* is devoted to Commission wildlife, fisheries and enforcement programs, and conservation issues affecting outdoorsmen in North Carolina. During the biennium, 204 articles were published in the *Wildlife Newsletter*.

In addition to the *Newsletter*, statewide "spot" news releases are issued. These cover such routine items as the opening and closing of seasons, and are frequently part of a much larger news effort. One example of this during the biennium was the publicizing of Operation Rock, a major undercover probe of illegal commercialization of freshwater striped bass which netted national news coverage. Seventy-three statewide news releases were published during the biennium, and currently an even greater emphasis is being placed on all facets of the news program.

Wildlife In North Carolina magazine remains the Section's showpiece, though, and continued emphasis is placed on upgrading its graphic and editorial quality. These improvements may be reflected in the magazine's jump in circulation from 58,000 to 71,000 subscribers during the biennium. Approximately half of the magazine was devoted to nongame wildlife in this period.

Audio-Visual Section

The Audio-Visual Section performs a wide variety of tasks related to photography and the production and distribution of audio-visual programs to the public.

One of the most appealing features of *Wildlife In North Carolina* magazine is its high-quality photography. Many of these photos, both color and black-and-white, are shot by Section photographers. In addition, a great deal of photography is shot for use in news releases, brochures, slide-tape shows,

Division Of Conservation Education

exhibits, and other projects. A strong photo processing and printing unit helps fullfill these goals.

During the past biennium, work demands on the Section have increased dramatically. The current emphasis is on the production of television public-service announcements and motion pictures. In 1985, a public-service announcement promoting North Carolina's Nongame and Endangered Wildlife Fund, for example, won first place in annual competition sponsored by the Association for Conservation Information, a professional organization of conservation educators from wildlife and natural resource agencies throughout the United States and Canada. Work is also underway on a 30-minute film featuring the Wildlife Commission's management of freshwater fisheries.

When completed, the Commission fishing film will be a welcome addition to the Commision's free-loan, audio-visual library. Our well-maintained film library is very popular, and over the past two years nearly 2,500 films, slide-tape shows, and filmstrips were loaned to schools, sportsmen's clubs, and other organizations. The Section produced three new slide-tape shows for the library during the biennium, and also added a number of new films as old or worn-out films were replaced. Besides handling distribution of these programs, Section personnel spend a considerable amount of time inspecting, cleaning and repairing films.

The demand for new photos continues to grow, and the photo files have now increased to over 75,000 color and black-and-white images. Section personnel spend considerable time recording and filing slides and photos.

The duties of the Audio-Visual Section are many and varied, from helping to produce a weekly radio show to photographing bald eagles. But, our objectives remain constant —to make North Carolina's citizens more aware of wildlife and its environment, and what the Wildlife Commission is doing to sustain them.

KEN TAYLOR

The key to the future *of all wildlife and outdoor recreation lies with kids like these shown fishing at a youth clinic. Division programs like Project WILD and CLASS Project have reached many teachers and more than a quarter of a million North Carolina school children.*

Educational Services Section

The Educational Services Section is an extension of our division throughout the state. Six education field representatives are stationed geographically across North Carolina, and are responsible for seeing that educational programs and wildlife information services are provided to all areas and people. Much of the section's work occurs behind the scenes to arrange media coverage for many wildlife and natural resource stories and events. Notable achievements of the section include:

- Production of the *Carolina Notebook*.
- Production of 347 television programs on wildlife.
- Preparation of 209 local and regional news releases.
- Weekly wildlife radio programs to 142 stations.
- 81 presentations to the public.
- 234 school programs.
- 112 teacher workshops lasting from one-half day to five days.
- Manned exhibits at 33 fairs and outdoor shows.

DEER IN FOG WILLIAM S. LEA/OCTOBER 1984

- 85 feature and Back of the Book articles, often including photographs, in *Wildlife In North Carolina* magazine.
- 20 articles for the *Wildlife Newsletter.*

Funding provided by the Nongame and Endangered Wildlife Fund has allowed the agency to place a greater priority on environmental education by offering several excellent wildlife education programs to teachers. The Section is responsible for

OCONEE BELL

HARRY ELLIS/APRIL 1985

KEN TAYLOR

It's easier *to inform and educate when the public can see the problem, and photographs, television and movie production are part of this function. Ted Dossett shoots footage of a hazardous waste dump.*

publishing the *Carolina Notebook* an educational primer founded by the Wildlife Resources Commission and produced cooperatively with the N.C. Agricultural Extension Service, Sea Grant, the Museum of Natural History, and other agencies. The *Carolina Notebook* is produced six times per year, and sent free to over 8,500 teachers and educators in the state. Each issue covers a different topic, and includes activities and projects that may be done in the classroom.

Project WILD and CLASS Project are two national environmental education programs that our Educational Services Section is training teachers to use. Workshops introduce teachers to the projects, and show them how wildlife and natural resources may be incorporated into existing classroom subjects. As written, the activities do not bias students on issues such as predator control, hunting, or land development. They do provide a means for teachers and students to investigate these issues, interpret their findings, and reach their own conclusions.

The Educational Services Section has also increased news coverage through personal visits with the media, stepped-up production of news releases and radio and television programs, and through playing a greater role in statewide news programs.

Special Projects

An additional area covered by the Division of Conservation Education is special projects. The purpose of this area is to promote special events, programs and projects. Many of these are concerned with generating revenue for wildlife programs.

Promotion of the North Carolina Wildlife Endowment Fund, which is supported by tax-deductible contributions and the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife In North Carolina* magazine, continues to be a high priority. During this biennium, provisions were made to allow the public to use Master Card or VISA credit cards to purchase lifetime licenses and magazine lifetime subscriptions. This has helped make these items more affordable to the general public, and has been very popular.

Other programs which have been promoted are the North Carolina Waterfowl Conservation Stamp and print program, the Sportsman's Stamp and print program, and the sale of the annual North Carolina Wildlife Calendar. With a circulation of over 71,000, *Wildlife In North Carolina* magazine offers the best opportunity to promote these programs.

During the past two years, a special effort has also been made to reach the public through greater participation in public events. For example, informational materials and displays have been provided for the Dixie Deer Classic and the Southern Sports and Outdoor Show. Also, a traveling exhibit featuring North Carolina's waterfowl heritage—which includes original art work for the state duck stamps, antique decoys, and information on waterfowl management and wetland preservation—has been displayed at museums across the state. ⊠

Division Of Administrative Services

The essential administrative support for all activities of the Wildlife Resources Commission is provided by the Division of Administrative Services. Major responsibilities include handling all fiscal transactions, processing all data, and collecting all monies due.

To accomplish this, sections within the Division of Administrative Services are responsible for specific areas of work. The Division is also responsible for monitoring transactions to ensure that they are appropriate and that they comply with laws, rules and regulations, for preparing reports for use in management decisions, and maintaining records of every transaction for statistical and audit purposes.

Financial Management

This Section is responsible for handling the reporting and accounting for revenues collected and for handling every transaction involving the Wildlife Commission. During the biennium $40 million in revenues were collected, and 21,487 checks were written for expenditures totaling $39.7 million.

A stockroom and warehouse are managed by this section, where a large variety of items—ranging from paper clips to bullets and hip boots—are bought in bulk for savings, and then are stored and distributed to other divisions as needed. During the biennium, the warehouse and stockroom filled 5,785 withdrawal requisitions for Wildlife Commission employees.

Purchase of all items used by the Wildlife Resources Commission was handled entirely, or monitored by this Section, to ensure compliance with laws, rules and regulations. During the biennium, 2,543 requisitions and 2,543 purchase orders totaling $5.7 million were handled.

Mailroom services for the agency were provided by this Section. During the biennium 1.7 million pieces of outgoing mail were handled for $430,500 in postal costs, and 24,000 UPS shipments on which freight costs were $49,300.

During the biennium, the Section also began handling calendar sales. The 10,000 copies of the 1986 Wildlife Calendar sold out.

DEBBIE CONGER

DEBBIE CONGER

License Sales

The License Section is responsible for the sales of hunting and fishing licenses, collection and deposit of revenues from these sales, and maintenance of records to account for each license. During the 1984-86 biennium, this Section worked with a statewide system of approximately 1,000 agents to sell 1.5 million licenses netting

***Melvin Jones** (left) and Michael McKinney handle a heavy volume of mail for the Wildlife Resources Commission (top photo), Carmen Ryals sells a license to Ed Jenkins from the Raleigh office (above); however, the sale of hunting, fishing and trapping licenses is administered by the Division statewide.*

Division Of Administrative Services

revenues to the Commission of $19.9 million. These revenues provided 53 percent of the support for Wildlife Commission programs.

During the previous biennium, the License Section began handling the lifetime license program. During this biennium, the program was expanded to allow purchase of lifetime licenses by credit card. This was accomplished with the help of the Wildlife Foundation, which agreed to pay the service charges applicable to accepting credit cards. The first credit card purchase was made in December 1985, and by June 30, 1986, a total of 466 lifetime license and lifetime magazine subscriptions had been purchased by credit card, bringing $127,050 into the Wildlife Endowment Fund. On June 30, 1986, lifetime licenses totaled 19,572 and had brought revenues of $4.7 million into the Wildlife Endowment Fund. These revenues, plus the interest earned, brought the Wildlife Endowment Fund balance to $5.8 million on June 30, 1986.

Our License Accounting Data Processing Program was updated to provide for direct, on-line access to agent accounts. This change increased efficiency by providing the capability to review an agent's account at any given time. This is helpful in monitoring and analyzing accounts, and in responding to questions regarding these accounts.

The License Section has always made daily deposits of revenues but not necessarily deposited each day all funds received on that day. During this biennium, the License Section was able to develop a procedure whereby each day the reports or remittances received for license sales are processed and deposited.

Boat Registration

This Section is responsible for registering and renewing registration of boats, collecting and depositing revenues for these registrations, and maintaining records to account for each registration. The total number of boats registered on June 30, 1986, was 220,613, an increase of 20,613 registered boats during the 1984-86 biennium.

The Boat Registration Section handles the registration or transfers of ownership of all boats, and maintains a statewide system

Summary Of Operations

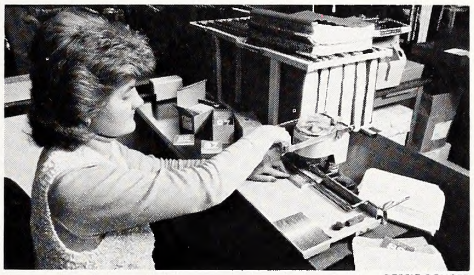
	1984-85	1985-86
Cash Balance Carried Forward From Preceding Year	$ 3,234,387.64	$ 4,759,588.62
Net Receipts for Year	19,468,803.20	18,884,454.13
Total Available Funds	$22,703,190.84	$23,644,042.75
Less Expenditures	17,943,602.22	19,716,248.80
Cash Balance June 30, 1985	$ 4,759,588.62	
Cash Balance June 30, 1986		$ 3,927,793.95

Expenditures—July 1, 1984-June 30, 1986

	1984-85	1985-86
Administration		
Administration, Policy & Regulation	$ 501,604.88	$ 492,337.18
Habitat Conservation	187,221.10	203,709.53
Construction & Maintenance	628,464.11	675,789.65
Administrative Services		
Finance and Purchasing	345,756.00	393,953.57
License and Motorboat Registration	563,255.59	581,695.84
Data Processing	336,067.71	357,506.18
Enforcement	6,829,250.92	7,911,930.13
Hunter/Boater Safety	413,000.49	455,383.10
Conservation Education	1,291,239.24	1,395,281.93
Inland Fisheries	2,034,371.03	2,067,189.24
Wildlife Management	3,806.846.63	3,953,860.27
Nongame & Endangered Species	191,560.34	169,998.68
Reserves and Transfers	814,964.18	1,057,613.50
Total Expenditures	**$17,943,602.22**	**$19,716,248.80**

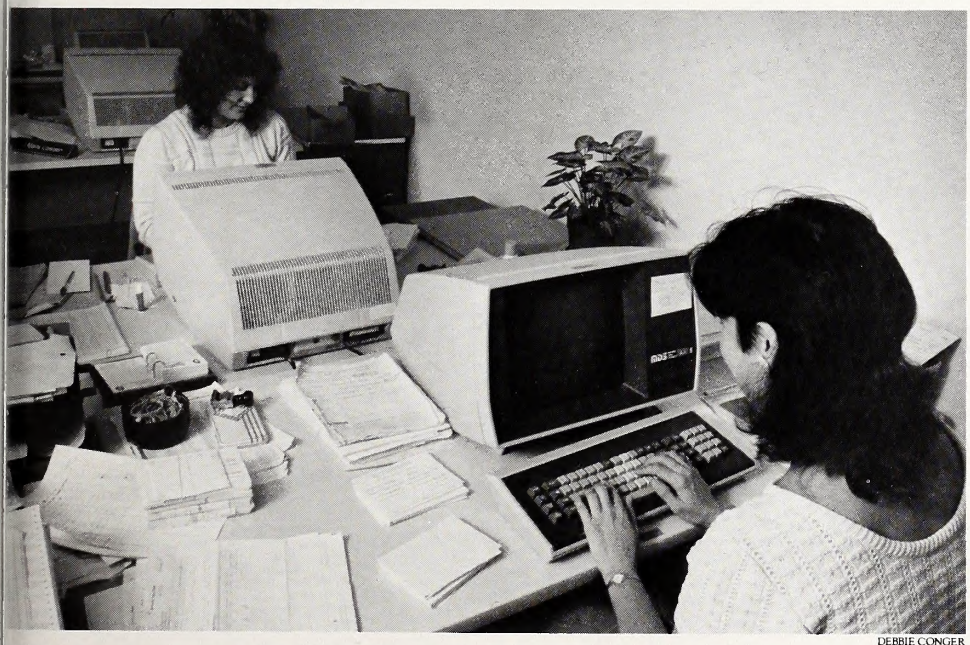
DUCK HUNTER — KEN TAYLOR/NOVEMBER 1984

DEBBIE CONGER



DEBBIE CONGER

***A major task** of the Division of Administrative Services is processing all invoices for the Wildlife Resources Commission, as well as, handling subscriptions for* Wildlife In North Carolina *magazine (left). Patricia Johnson (above) validates decals for boat registrations.*



DEBBIE CONGER

GRAY FOX STEVE MASLOWSKI/APRIL 1986

***Many data processing services** are provided by the Wildlife Resources Commission (above), and this includes such vital data as surveys, payrolls, license holders, motorboat registrations and other information. Karen Carroll (left) and Mary-Ann Long key information into the system.*

of 205 agents to assist with renewals of registrations. Some registrations are renewed annually, and others opt for three-year registrations. An average of around 100,000 boat registrations must be renewed each year.

During the 1985-86 fiscal year, this Section worked to develop a procedure for processing the registrations/renewals and depositing funds on the date received. The test came during the summer of 1986, because the high volume of boat registrations in the summer usually results in delays. The Section was able to keep the work current, eliminating delays in the registration process.

Providing needed information regarding boat registrations to other governmental agencies or law enforcement personnel was an activity which continued during the biennium. There were also court cases which required written or personal testimony.

This Section continued the procedure of tagging the records of boats reported stolen and those for which the registration was paid by worthless checks. This allows the Section to take appropriate action when another registration comes in on that boat.

Data Processing

The Data Processing Section continued to process a multitude of data in preparing reports and updating files. The motorboat registrations, *Wildlife In North Carolina* subscriptions, and the Departmental Accounting System continued to require

Division Of Administrative Services

RACCOON LARRY DITTO/JANUARY 1986

a great amount of effort in this Section.

The most noteworthy activity of this Section during the biennium was the conversion of the hunting and fishing license accounts from a batch-processing application to an "on-line" system. The new system affords us up-to-date status of each agent's activity, immediate retrieval of data related to an agent's account, delinquent-sales reporting, and many other functions that are useful in the management of the license accounting.

This Section has worked closely with the Division of Conservation Education in developing a Project WILD program to gather data for comparison statistics and reporting.

New equipment has been purchased for implementing the "on-line" Wildlife Endowment Fund lifetime license program. With this equipment, the Commission will have the ability to create in-house plastic, embossed licenses for lifetime license holders, and update the master files while over-the-counter sales are processed.

This Section was also involved in planning for future needs by identifying ways to improve the Wildlife Commission's data-processing methods and management of information systems. During the next biennium, these plans will be implemented to accomplish needed rewrites of some systems and on-line capabilities for more programs. ⊠

Endowment Fund

	Interest	Principal
1984-85	$370,398.79	$1,156,931.17
1985-86	501,360.63	1,403,914.84
Total	$871,759.42	$2,560,846.01

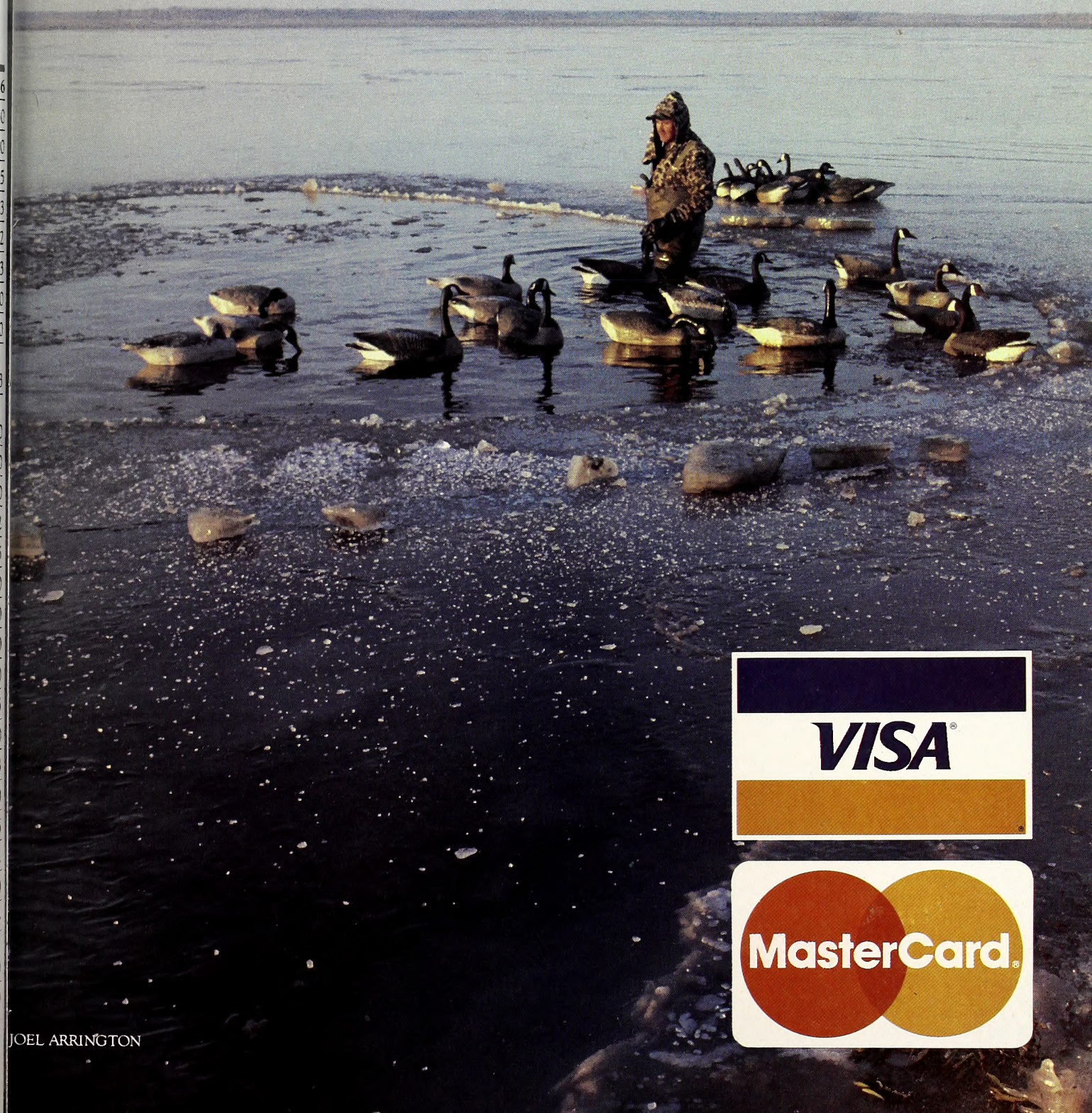
Revenues—July 1, 1984-June 30, 1986

	1984-85	1985-86
Hunting and Fishing Licenses	$10,237,218.06	$10,071,374.30
Bonding - Agents	17,021.97	12,198.00
Motorboat Registration	1,172,353.52	1,170,621.25
Federal Cooperation	4,460,738.49	3,222,786.23
Management Area Receipts	342,441.84	319,684.92
Gasoline Fuel Tax	401,729.03	397,198.93
Transfers From NRCD	1,567,500.00	80,000.00
Interagency Transfers	30,228.34	.00
Transfers from Department of Revenue - Nongame	197,508.25	259,456.63
*Transfer from Endowment Fund - Interest	88,559.00	139,859.00
Sale of Publications	278,704.53	303,448.50
Waterfowl Print Royalty	193,671.00	151,329.00
Sportsman Print Royalty	10,665.00	2,519.92
Replacement Costs of Wildlife Resources	32,675.55	26,555.25
Rental of State Property	7,188.25	11,386.10
Bequests	16,477.23	.00
Sale of Surplus Property	135,551.68	131,394.60
Sale of Calendars and Stamps	57,950.00	51,937.00
Cherokee Indian Reservation - Trust	21,038.29	29,632.85
Personalization Fees	10,015.00	11,395.00
Fees, Licenses and Fines	26,694.00	45,047.73
Sale of Endowment Items	4,559.35	2,224.40
Sale of Conservation Items	4,689.01	4,322.96
Donations	85,240.88	8,664.42
Fontana Creel Survey - TVA	13,272.88	2,115.20
Miscellaneous Receipts	55,112.05	137,797.94
*Transfer from Department of Revenue - Sales Tax	.00	2,000,000.00
Prior Fiscal Year Obligations	.00	291,504.00
Total Revenues	**$19,468,803.20**	**$18,884,454.13**

Buy one for yourself or a friend!

Lifetime hunting and fishing licenses and lifetime *Wildlife In North Carolina* subscriptions can now be purchased using your MasterCard or VISA. This lets you budget the cost of your lifetime license or subscription in monthly installments. It's a small price to pay for a lifetime of hunting and fishing or a lifetime of reading *Wildlife In North Carolina*.

To order, use the form on the left.



JOEL ARRINGTON

Conservation is a state of harmony between men and land. By land is meant all of the things on, over, or in the earth. Harmony with land is like harmony with a friend; you cannot cherish his right hand and chop off his left. That is to say, you cannot love game and hate predators; you cannot conserve the waters and waste the ranges; you cannot build the forest and mine the farm.

From A Sand County Almanac
by Aldo Leopold.

LITHOGRAPHY BY EDWARDS & BROUGHTON
COMPANY, RALEIGH, NORTH CAROLINA

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WILDLIFE IN NORTH CAROLINA

FEBRUARY, 1987 75 CENTS

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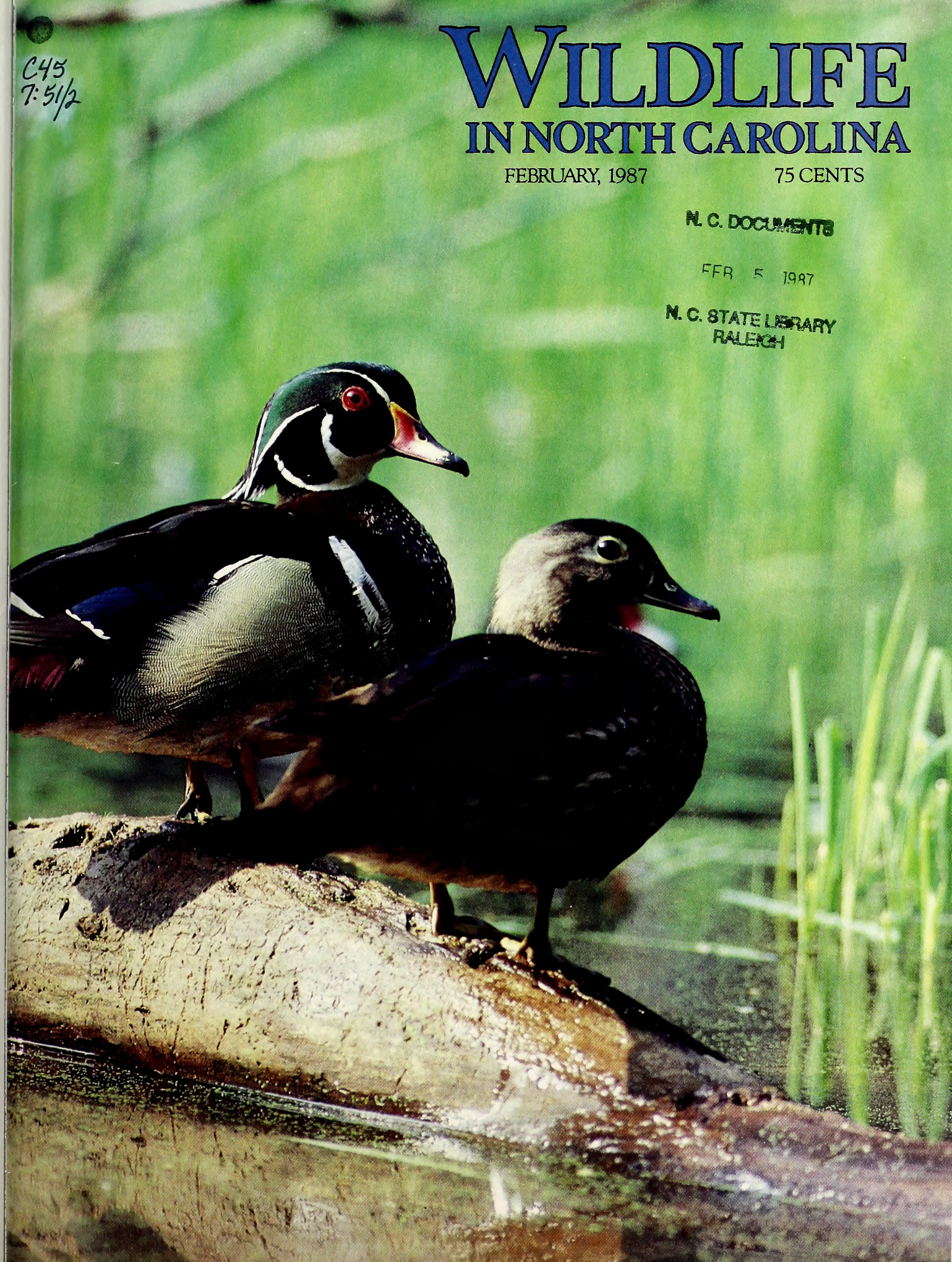

The Case Of The Disappearing Steelhead

by Jim Dean

The tale is told of an avid angler from the East Coast who ventured to Oregon and hired a guide to help him catch a big steelhead. A steelhead, by the way, is a migratory rainbow trout native to the Pacific Northwest. All rainbows are migratory by nature, but these particular rainbows have the instinct and opportunity to spend much of their lives in the ocean, and as adults they re-enter the coastal rivers where they were born to spawn. These spawning runs carry them far inland to the tiny headwater tributaries.

CURTIS WOOTEN

When a steelhead returns from the sea, it's a burly handful of quicksilver that may weigh 10 to 20 pounds, and fishermen brave frigid weather to seek it throughout its upstream winter odyssey. Despite their numbers, these fish are tough to hook, and perhaps tougher to land. Not surprisingly, west coast steelhead rival east coast Atlantic salmon in near legendary wariness and strength, which is why anglers travel great distances to seek them.

This brings us belatedly back to our Oregon visitor. For several days, he and his guide fished in a cold drizzle hip-deep in a big icy river. Finally, the visitor hooked a 15 pounder fresh from the sea. Up to that moment, his fishing experience had been largely confined to 10-inch browns and rainbows, and a few bass up to about 5 pounds. Now, suddenly, he was anchored to a fish that ran 100 yards downstream so quickly that the reel plates were smoking. Almost as quickly, the steelhead swapped ends and raced back upstream in a series of wild, greyhounding leaps. The fish was so strong and fast that it seemed to be jumping in several places at once.

Finally, the leader broke and the angler slumped to the ground exhausted both mentally and physically.

"That's the most incredible, uncontrollable fish I've ever hooked," he said after he'd managed to catch his breath.

"Yup," agreed the guide matter-of-factly. "They don't steer too good."

It's not surprising that efforts have been made to transplant sea-going rainbows to other parts of the nation, especially where big trophy fish are rare. Indeed, fisheries biologists for the N.C. Wildlife Resources Commission tried for several years beginning in 1975 to "steer" some steelhead to western North Carolina.

"Steelhead have been successfully introduced to the Great Lakes, and we believed it was possible to establish them in several of our large mountain lakes where there were good tributaries for spawning," said Jim Borawa, Commission fisheries research coordinator for the mountain region.

From 1975 through 1983, approximately 355,000 juvenile steelhead were stocked mostly in Lake James, Nantahala Lake, Santeetlah Lake and Fontana Lake. In the early going, the most promising sites were at Lake James where the steelhead could conceivably spawn in the Linville River. The Nantahala River above Nantahala Lake also looked likely.

While the steelhead runs failed to become established in James, Santeetlah and Fontana, the Nantahala River seemed to be an exception. Beginning in January and February each year, a fairly significant number of what seemed to be steelhead moved up the river to spawn, and some of these fish were fairly large—20 inches or longer. In recent years, this winter fishery has become known as the "steelhead" run.

It turns out, however, that these fish are not steelhead at all, but large spawning rainbows from private water. In fact, most likely there are no steelhead runs anywhere in western North Carolina, including the Nantahala.

"We identified 91 tributaries to the lakes where we stocked steelhead," said Borawa, "and conducted extensive sampling through the fall and winter, and we found no significant numbers of migrating fish at the times and water temperatures when spawning should have been taking place—except in the Nantahala River. We found a large number of rainbows there, but we suspected these fish were coming upstream from a private fishing club. You really can't look at them and distinguish which are steelhead since they're all rainbow trout.

"To check, however, we fin-clipped 130 rainbows while they were upstream on their spawning runs, and 96 were later caught and released downstream in the fishing club waters. The club also feeds these fish, and when we analyzed the scale growth, we found that the growth rates exceeded those found in a natural situation. We suspect that there just wasn't enough natural food or ideal habitat for the steelhead in our mountain lakes."

The steelhead project may not have worked out as planned, but not all the news is bad. Because many fishermen thought they were catching steelhead, and were willing to brave the cold weather to try it, they uncovered a fairly good fishery for trophy winter-spawning rainbows in the Nantahala.

Nor is the Nantahala the only river that affords such fishing. Hardy anglers have known for years that the Rocky Broad River above Lake Lure sometimes yields a good winter-run rainbow. Even so, the Nantahala is still the most consistent producer. It's cold fishing, and a lot of anglers have traveled halfway across the state and spent three days trying their luck without catching a single fish. Others have caught nice trout.

But, most likely, they're not steelhead, just plain ol' 2-foot long rainbow trout.

February, 1987
Volume 51, Number 2

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Cover *Pairs of wood ducks like these can be helped by man. Wood duck boxes placed on lakes provide a home for the nesting female and her brood. Photograph by F. Eugene Hester.*

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Our Oldest Animals

written by Lawrence S. Earley and John Alderman
illustrated by David Williams

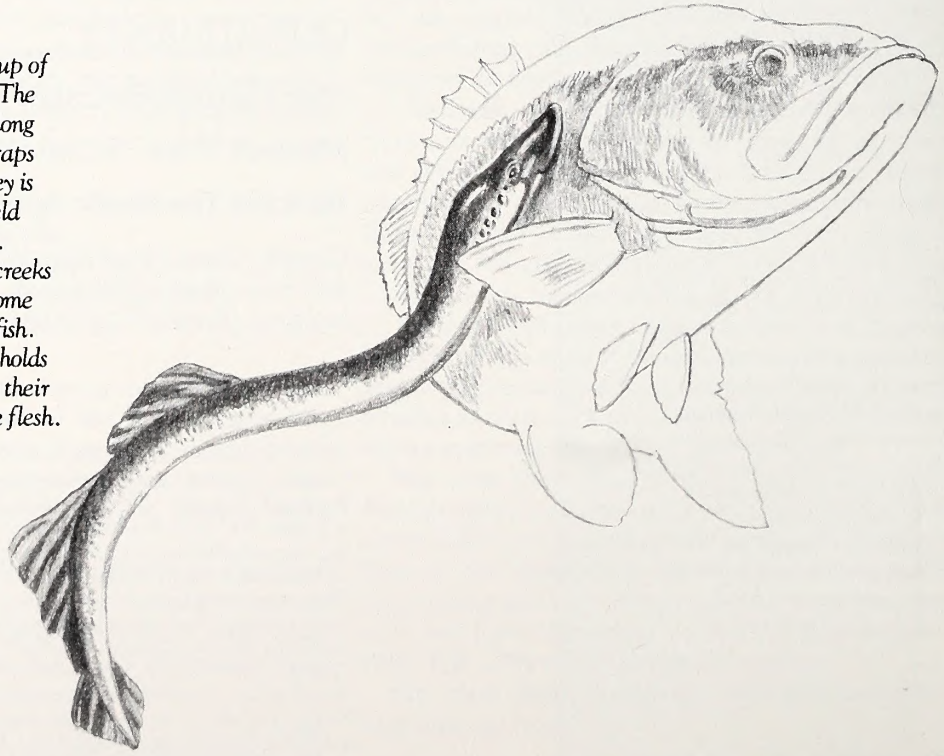
On December 22, 1938, fishermen off the shores of South Africa found a strange fish in their haul. Its bright blue scales easily stood out among the grays and whites of the other fish, and it was further distinguished by unusual, fleshy paired fins positioned along the bottom of its 5-foot body. The fish was later identified as a coelacanth—a fish presumed to have become extinct 70 million years before!

The discovery of this living fossil was little short of astonishing. The fish was well known in fossil records, appearing some 100 million years before the dinosaurs and then seeming to disappear about 70 million years ago. Not only was it found to be alive, but it had scarcely changed at all during that immense span of time.

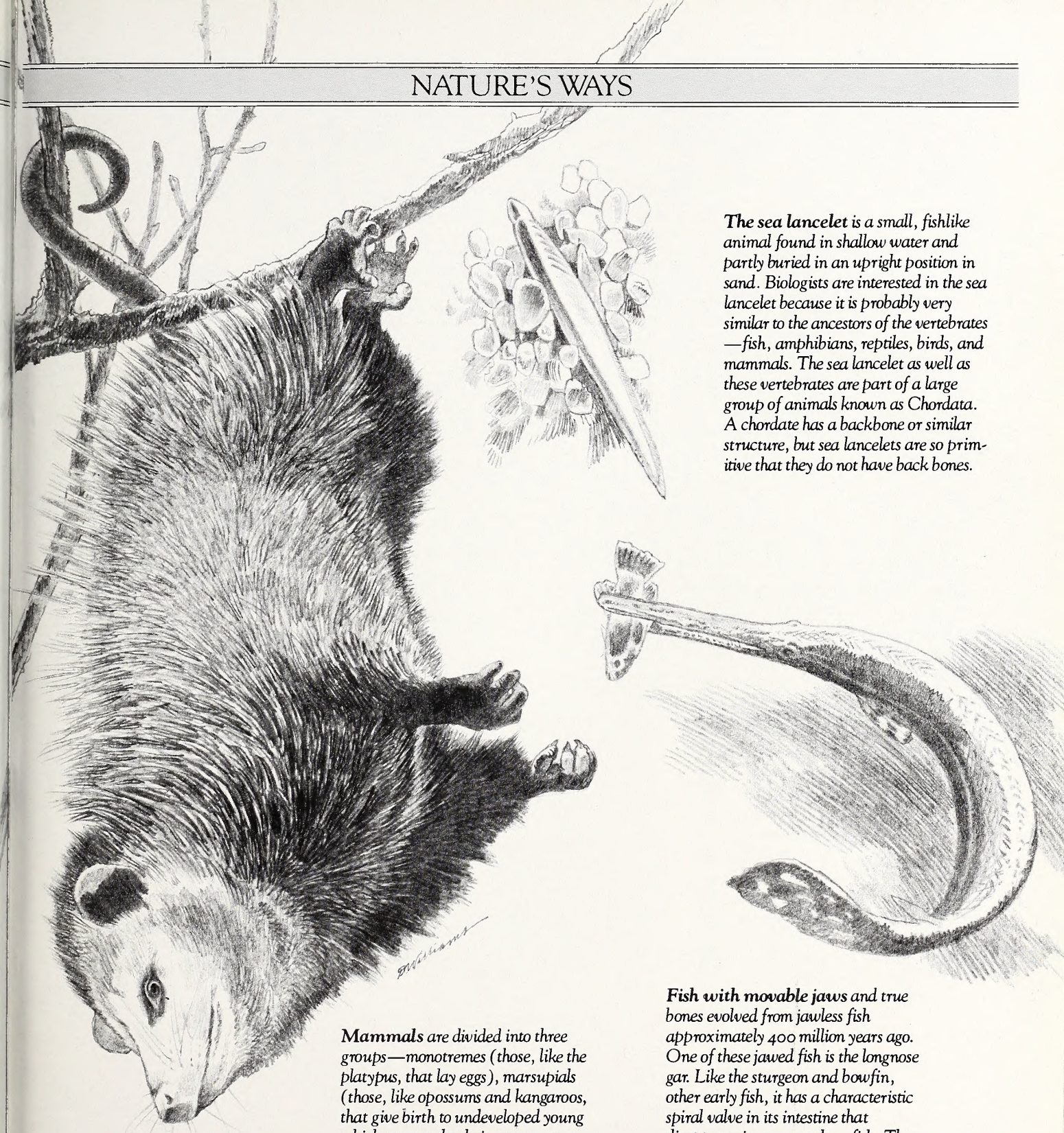
North Carolina does not have an animal quite like the coelacanth, but it does have many species that are old, even ancient. Some, indeed, are among the most common species in the state. Almost everyone is familiar with opossums, moles, shrews, and turtles, nor are sturgeon and longnose gar unusual to see or even catch. All have an ancient lineage.

It is tempting to call such creatures "primitive" animals, but the term is not quite accurate. Suffice it to say, a gar or a possum has characteristics that appeared quite early in the development of its species. Each is a representative of an ancient group of animals that died out long ago in the evolutionary process. Though their remote lines have declined, these species have found niches in their ecosystems and they survive in good shape today. They are haunting presences from our prehistoric past.

Ancient amphibians *possessed a head lacking holes other than those needed for sight and breathing. They passed on this "solid skull" to the ancient reptiles, but of the reptiles alive today, only the turtles have solid skulls.*



Lampreys *are one of our few representatives of an ancient group of animals known as jawless fishes. The lamprey looks like an eel with a long fin along its lower back which wraps around its tail. Because a lamprey is jawless, its mouth is constantly held open on the underside of its head. Several species are found in the creeks and rivers of North Carolina. Some lamprey species are parasitic on fish. While their vacuum-cup mouth holds them tightly to their host, they use their sharp rasping teeth to cut into the flesh.*



The sea lancelet *is a small, fishlike animal found in shallow water and partly buried in an upright position in sand. Biologists are interested in the sea lancelet because it is probably very similar to the ancestors of the vertebrates —fish, amphibians, reptiles, birds, and mammals. The sea lancelet as well as these vertebrates are part of a large group of animals known as Chordata. A chordate has a backbone or similar structure, but sea lancelets are so primitive that they do not have back bones.*

Mammals *are divided into three groups—monotremes (those, like the platypus, that lay eggs), marsupials (those, like opossums and kangaroos, that give birth to undeveloped young which must make their way to an external pouch where they develop fully), and placentals (the largest group whose young develop full term within the womb of the mother). Marsupial reproduction methods are considered more advanced than the monotremes, but more primitive than the placentals. Our opossum belongs to one of the oldest of marsupial families, rising about 70 million years ago and continuing to this day.*

Fish with movable jaws *and true bones evolved from jawless fish approximately 400 million years ago. One of these jawed fish is the longnose gar. Like the sturgeon and bowfin, other early fish, it has a characteristic spiral valve in its intestine that disappears in more modern fish. The gar also has an armored layer of tough, diamond-shaped scales that were common among ancient, now extinct fish. Another "primitive" characteristic is the shape of the tail fin.*

JANE ROHLING

CONDOS FOR DUCKS

Over 3,000 wood duck boxes have been built and placed in the Piedmont by the Guilford County Wildlife Club.

by Jane Rohling

WANTED: Central North Carolina. Nest box with a view. Require waterfront location with plenty of trees. Desire safe neighborhood for growing family. Should be clean and furnished with bedding. Prefer short-term lease with option to renew next spring. Call Woodie.

Real estate for wood ducks is in short supply in the North Carolina Piedmont these days. A woodie hunting for a home can still do pretty well in the eastern part of the state, but housing has been scarce in the populous Piedmont. In recent years, however, the

***Multiple wood duck boxes,** as well as single boxes, attract ducks and can be built at a considerable savings. For the "condominum" at left, only one metal pole was required. The ducks don't seem to mind the company. Children enjoy building boxes, as Patrick Shanks (left) and Charlotte Weigel of Greensboro found out.*

KEN TAYLOR

Wood Duck Box Plans

Cypress is the best choice of lumber for wood duck boxes. It is locally available, relatively inexpensive and extremely durable, even without staining or other treatment. Rough-sawn 1 inch by 10 inch boards are ideal. Half-inch or thicker exterior plywood is second best, but should be stained. It is harder to work with, but has the advantage that with a 4-foot sheet you can expand the width of the box sides to 12 inches, a more ideal size. Unfortunately, with plywood you lose the ability to rabbet the bottom, making the box a little less durable.

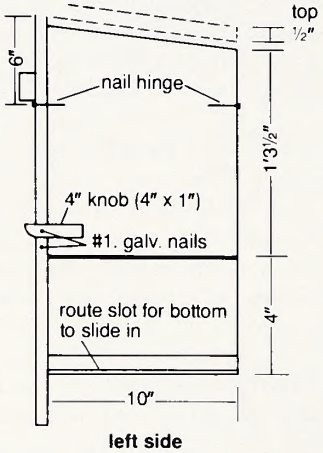
Nails should be 3-inch double-dipped galvanized type—the "splitless" kind used to put up board siding. Ordinary nails will rust.

A small piece of hardware cloth tacked inside the front of the box is a big help to the young ducklings when they get ready to climb out. Another thing that gives them a boost is to hang the box at a slight angle, leaning toward the front (as shown in the right side view of the box on the post).

Metal poles are best. They are quite expensive, but you may be able to get damaged ones from your local highway department. You can have them cut and welded back together in the lengths you want. These poles are galvanized, and they already have holes drilled in them. You can also buy angle iron. It comes in 12-foot lengths for about $5. Just cut them in half and drill a couple of holes in them. Wooden poles should be a last resort. They're difficult to sink in water and they're easy for predators to climb. If you do use wood, be sure to attach a cone-shaped metal predator guard around the pole.

Maintenance is essential to your wood ducks' nesting success. The boxes should be checked and cleaned at least once a year. This is especially true if you've had screech owls as tenants! Wait until after a couple of good hard freezes to open the box or you may find a nasty surprise inside—hornets like nest boxes, too. You can avoid the hornet problem by taking the yellow strip out of a Shell No-Pest Strip and putting it into one-inch pieces. Nail one of these inside the top of each box and it will kill the insects without harming the ducks.

After cleaning the box, fill the bottom to a depth of about 4 inches with fresh sawdust or wood shavings so it will be ready for the next nesting season.



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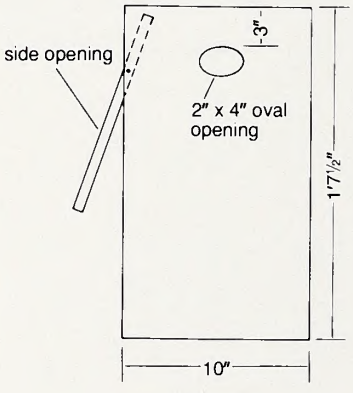
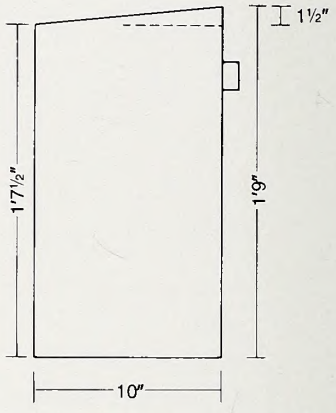


front



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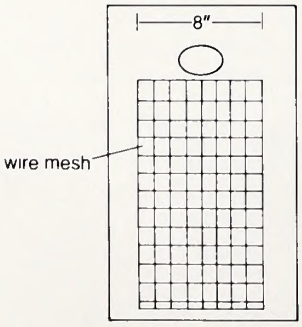
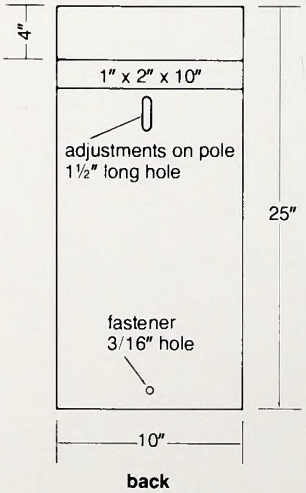


inside front view



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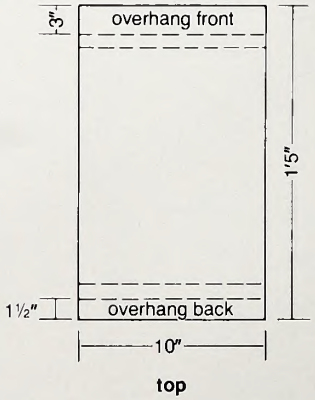


top

All materials to be cypress wood.

picture has brightened with a sudden boom in new home construction. Thanks are due in large part to the dam-building, timber-flooding beaver, but a handful of hammer-wielding conservationists have also played an important role in the home building.

For the past 10 years, a number of dedicated conservationists in Guilford and Alamance counties have been hard at work building wood duck nesting boxes to help replace the den trees that have been felled by developers to make way for the area's rapidly growing human population.

It all started when J.W. Busick, a vocational agriculture teacher at Western Alamance High School near Elon College, began building wood duck boxes in his classes. He felt that the project would improve the carpentry skills of his students and teach a valuable lesson in wildlife conservation at the same time. It appears he was right on both counts, because since then, his classes have produced close to 3,000 nest boxes. But this was just the beginning.

A couple of years ago, Busick presented a program on his class project to a meeting of the Guilford County Wildlife Club. Greensboro attorney, John Weigel, who was president of the club at the time, had been looking for a long-term wildlife-conservation project for club members to get involved in, and building wood duck boxes seemed to fit the bill.

"I picked a number out of the sky—1,000—which I thought was a ridiculous number, and something that would take years to do," Weigel recalled. "What I had envisioned to be a four-or five-year project, got done in a year and a half!

"One object we had going into this project was to give people the physical opportunity to participate in a conservation project," he said. "And volunteers of every conceivable description were anxious to get involved. They ranged in age from senior citizens to Cub Scouts, and came from all walks of life. They even got help from the courts in the form of court-ordered community-service workers.

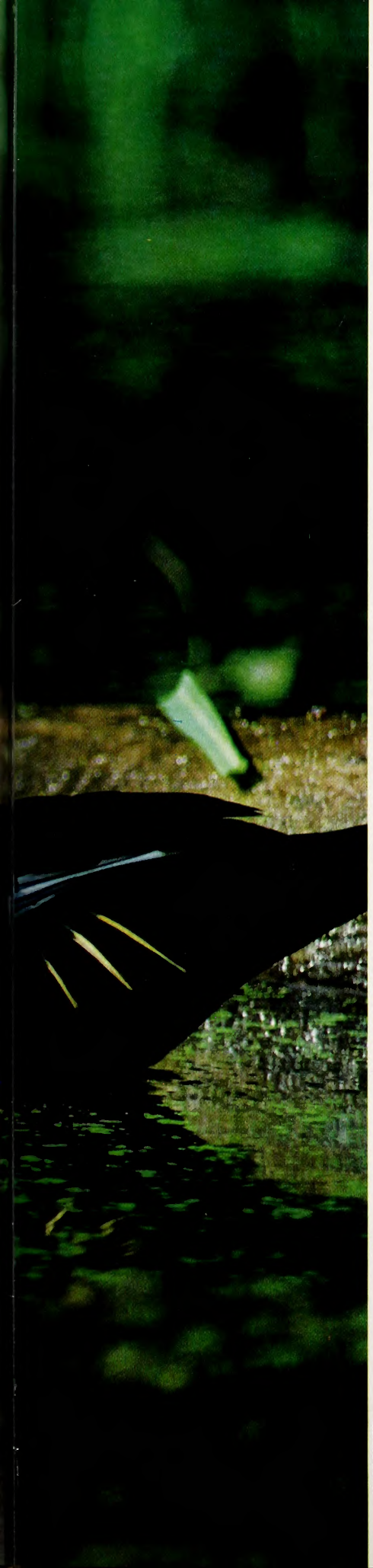
"At one time we had a deadline we wanted to meet and we probably roped in some of the biggest game-law violators in the county to help," Weigel said with a wink and a grin. "Six or eight of them built 75 boxes in one afternoon."

"Sometimes people are a little reticent to step forward in any kind of volunteer work," Weigel has learned, "but if you just grab them by the hand and put a hammer in it and say, 'Go to it!' they're happy to help."

Of course, some people need a little more help than others, but Weigel says you've just got to learn to accept the efforts of volunteers at the level they are able to perform. "Which

KEN TAYLOR

***John Weigel** (left), Patrick Shanks (center) and Charlotte Weigel (right) make house construction for wood ducks fun. Weigel's Guilford County Wildlife Club built 1,000 wood duck boxes in a year and a half, with the aid of volunteers from the community.*



means some of the boxes we get to rebuild," he added with a smile.

"One of the keys is to get a nucleus of people who are used to working around machinery. Obviously, running saws and that sort of thing is something that can be dangerous and needs to be carefully controlled and well-organized."

According to Bodie McDowell, outdoor writer for the Greensboro *News and Record* and a club member, a small crew of six or eight people meets at the shop of Claude Bailey, a local contractor, to cut out the boxes.

"That group of people can completely cut out 150 boxes a night," McDowell boasted. "Then we transport them to the clubhouse on Lake Jeanette where other volunteers can put them together safely."

Most of the boxes built by Busick's classes have gone to farm ponds and other privately owned land in Guilford and Alamance Counties. The McCleansville Wildlife Club even bought over 200 boxes from Busick to put up in the McCleansville area. So, in order to avoid a duplication of effort, the Guilford club decided to branch out to some new markets, and offered free boxes to several municipal, state and federal agencies in North Carolina. Nearly 500 boxes were given to the N.C. Wildlife Resources Commission, and about 60 were sent to Mattamuskeet and Pungo National Wildlife refuges in eastern North Carolina. But Weigel was especially interested in tapping a resource that had been largely overlooked as wood duck habitat—municipal water-supply lakes.

"A large number of those lakes have second- and third-growth timber so that by themselves they would be many years from providing natural nesting habitat for wood ducks. That habitat can be enhanced very readily by the use of nesting boxes," Weigel observed. "And these are facilities that can be adopted by local people who have an interest in the boxes, which is important to keep the project going."

So far the Guilford Wildlife Club has provided nest boxes to the cities of Greensboro, Reidsville, Kernersville, Chapel Hill, and even places as far away as Hendersonville and Rockingham. Municipal water and sewer departments have been very appreciative of the boxes and apparently so have the local wood ducks. Weigel and the club's current president, Larry Shanks, recently completed a survey of the 46 boxes placed on Lake Jeanette in the past couple of years.

"We had eggs hatched in 36 of the 46 boxes," Weigel reported. "That's 78 percent if I figure correctly, much better than our first year." Don Michael of the McCleansville Wildlife Club has gotten similar results.

Hatches have not been as good in the three Greensboro city lakes, perhaps because some of the older boxes were placed in locations that were less ideal. The first two dozen or so boxes to be placed at these lakes were placed on trees, in secluded places where you'd think a duck would like to nest—far from the crowds and out of sight. Ironically, that may have been the problem.

"One of the criteria that appears to be important is visibility—that is, whether or not the wood duck can find the box," explained Weigel. "So, we place our boxes in more open locations. Also, we found better success in placing the boxes on metal posts in the water, which reduces predation and completion. Squirrels and screech owls love wood duck boxes. We use 6 feet arbitrarily as the farthest a squirrel can jump from a small limb and 24 inches as the minimum height above water. Our experience has indicated very little predation using metal poles in the water. The direction the box is facing doesn't seem to make any difference, but use of boxes seems to vary from year to year for some unknown reason."

Another Greensboro area conservationist, Worth Moser, has discovered that wood ducks don't mind having a lot of company. Moser has eight boxes on his half-acre lake and he gets nesting activity in most of his boxes every spring. He's even erected what he calls a "wood duck condo"—four boxes on one pole. Since the metal pole can cost as much as the box, this could add up to considerable savings. Multiple boxes are also being used on an experimental basis on Pungo National Wildlife Refuge with good results. The conclusion seems to be that if wood ducks like one box, they'll love a few more—even on the same pole!

Although North Carolina wood ducks have made a dramatic comeback since the turn of the century when they were almost exterminated by uncontrolled shooting and trapping, they're still battling the encroachment of civilization on their wooded wetlands. However, just as concerned sportsmen came to their rescue with protective legislation years ago, conservationists today are ready to lend a helping hand. And hammers in the hands of hundreds of willing volunteers have turned thousands of board feet of cypress and metal poles into a grand lesson in cooperation and conservation—and a real estate bonanza for our wood ducks. ⊠

***The wood ducks** have flourished with the new abundance of boxes. A survey on one Greensboro area lake revealed that eggs hatched in 36 of the 46 boxes constructed.*

F. EUGENE HESTER

EIGHTY-FOUR YEARS ON OCRACOKE

Thurston Gaskill of Ocracoke has been leading hunting and fishing parties in Pamlico Sound almost all his life. The veteran guide has witnessed a lot of changes during that time.

interview and photographs by
Lawrence S. Earley

Thurston Gaskill is a diminutive man of gentle speech whose words come slowly as if he were taking the time to weigh each one. His silver hair lies in flat swirls. His hands are broad and deeply furrowed, a sign of the many years he has spent outdoors.

Like his father before him, Captain Gaskill has been guiding hunters and fishermen around Ocracoke Island since he was 17 years old. That's a long time. "I was 84 my last birthday, September 30th," he says. "I've enjoyed taking parties out and I wonder why I cannot bring myself to quit. It's something in my blood, I guess."

Captain Gaskill grew up on Ocracoke, a 14-mile link in the 324-mile chain of barrier islands that run along North Carolina's coast. Though only a small island and isolated for much of its existence, Ocracoke has played an important role in the history and seafaring life of the state. It briefly tempted Sir Walter Raleigh's settlers before they decided on Roanoke Island. Blackbeard used the island for a safe harbor, as did many other sailors who sought shelter from skirmishing gales in the Atlantic.

Generations of Ocracokers have made their living off the bounty of Pamlico Sound and the Atlantic Ocean, harvesting the channel bass, croaker, trout and flounder; the ducks, brant and Canada geese. Others like Captain Gaskill have turned to guiding as a way of life, rising before dawn to put hunters in blinds by break of day, crisscrossing the sound with a boatful of fishermen. Gaskill quit the hunting business for good not long ago, but acquaintances say that he aggressively competes with men half his age for a fishing party.

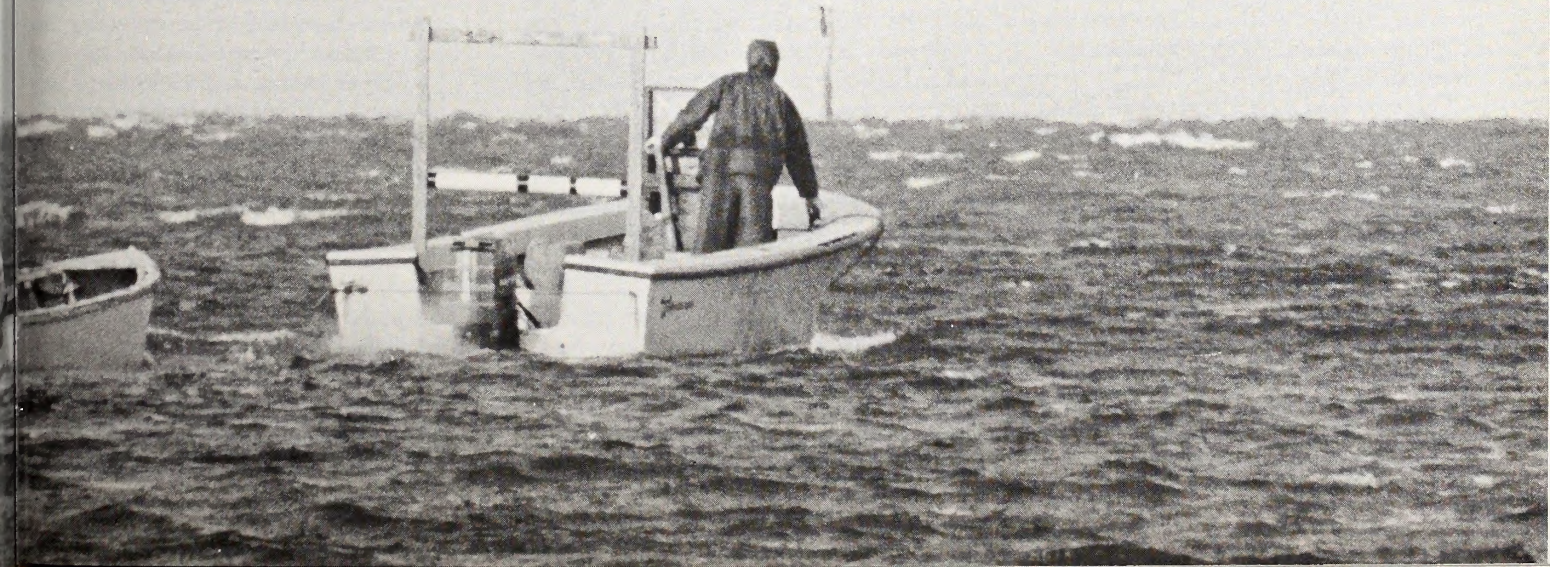
On the day I traveled to Ocracoke, clouds massed in front of the sun and shafts of light broke through to illuminate the dull surface of the water. In his home on Route 12, not far from the harbor, Captain Gaskill recalled the market hunting days of his youth, the eelgrass that once choked boat props in Pamlico Sound. He described the sounds of explosions off the coast during World War II, the horizon glow of torpedoed ships afire. He told me about his long life on Ocracoke.

I was born here on Ocracoke in 1902, grew up down on the lake shore. We can't trace back when our generation first came here, but I myself claim we were some of the very first settlers, other than the Indians. We might even be descendants of Blackbeard the pirate. He worked in and out of Ocracoke Inlet. I understand he had a number of wives, kept most of them over at Bath. Now what would a man do with six wives?

My father was a hunting, fishing guide before me. In my early years we lived down on the waterfront, then known as Cockle Creek, now called Silver Lake. As a boy I remember going down to that Cockle Creek shore and fishing a lot for just little pin fish. We just bent a pin to make a hook out of it with just a little reed pole, or hand line we called it.

I grew up there until I was 13 years old.

***Commercial fisherman** heads out to Pamlico Sound from Silver Lake, Ocracoke's small harbor. Commercial fishing has been a traditional way of life for Ocracoke's people.*



Carolina Profile

And then my father bought an inn, Pamlico Inn, down on the Pamlico Sound side, the west side of the village of Ocracoke. My father bought that place and started running it and expanding it and building on it. I well remember maybe 100 visitors on Ocracoke at one time would be called a crowd. Today thousands pass through here per week. One interesting thing about the beginning of that Pamlico Inn is that you could get lodging and three big meals a day for $17.50 per week.

My daddy had a hunting club on a little island west of Ocracoke called Beacon Island. He would take people duck and goose hunting and they would come from all parts of the East Coast, from South Carolina to Maine, and spend four, five, six days duck and goose hunting. Of course Ocracoke was very isolated then. People coming from New York had to come a long way. They'd come by train all the way to Beaufort, North Carolina, and then take the trip by boat from there up here. Almost took half the week to travel back and forth. They'd usually come into our camp back on Sunday and go out the next Friday or Saturday.

Back in those days, there was a mail boat that ran from Morehead City to Ocracoke, and another from Ocracoke to Morehead City. One boat would leave each place each morning at six o'clock and it would take just about all day to make the trip. To get to Morehead City, you would have to get on that boat early in the morning, six o'clock, and stop at all the little places between—Portsmouth, Hog Island, Atlantic, Davis. And another boat would be coming from Morehead City to Ocracoke. They carried passengers each way, and they ran six days a week. They didn't run on Sunday.

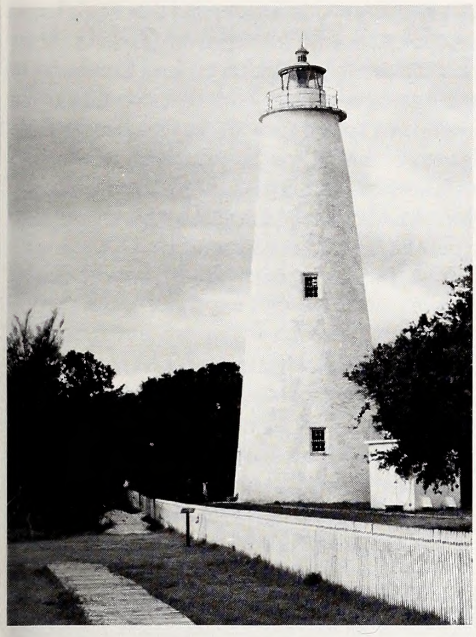
In later years—I don't remember the exact dates, maybe 1925 or 30—they later shifted the route from Morehead City to Atlantic. That was after the roads were built from Morehead City. So our later mail boats only came from Atlantic to Ocracoke, Ocracoke to Atlantic.

This mail boat took just about all day to make the trip, so sometimes my father would take his own boat and meet the parties who would come in to Beaufort, North Carolina, by train, and he would meet the parties there and bring 'em on up to the camp at Beacon Island.

I remember at the age of about 15, 16, I was over to this camp with my father for Christmas holidays. And we were looking for a party on the mail boat coming from Morehead City that particular day in December 1917, the beginning of what is known as the "Big Freeze of the Century." Well, the mail boat did not get very far from Morehead City before it had to turn around and go back due to it getting so cold and the boat icing down. They were afraid to attempt to make the trip. Therefore the party didn't get to its destination at this camp. And there we sat in this big snow storm with a freeze coming on and there was at the camp at the time just my father and a man by the name of Bill Ellis Williams and myself. We spent some 21 days froze in at that camp. Nobody could come or go. No radios in that day and so we just sat it out.

We killed about 325 ducks, geese and brant, and could have killed a lot more but we got afraid we would not be able to dispose of them. That was the last year that you could legally sell migratory waterfowl. We kept these birds stored in one end of the camp where the temperature was just high enough so they would not freeze solid. And when the freeze did clear and we got back to

Longtime fishing *and hunting guide Thurston Gaskill sits in front of his Ocracoke home with dog Gander. Gaskill passes on a conservation message to his younger customers, "to go hunting and fishing as a recreation and as a sport, not to see how much game you can kill or how many fish you can catch."*



Begun in 1823, *Ocracoke Lighthouse keeps constant vigil at the south end of the island. Eighteenth-century pilots were needed to guide boats through the dangerous channel, and settled on Ocracoke Island.*

Ocracoke, I remember my father selling the entire bunch of game we had to a man by the name of Will Willis, who was captain of one of the mail boats that ran from Ocracoke to Morehead City. And on that trip, he had to go out Ocracoke Inlet and on the ocean side and in Beaufort Inlet, into Morehead City, because the Sound was frozen. There are still a number of people that remember the Big Freeze of the winter of 1917 and '18.

The boats that we used for hunting and fishing in that day were just big, flat-bottomed skiffs, homemade out of juniper and cypress. I remember that my father had one of the first gasoline motors that came to Ocracoke. They were strictly inboard motors installed on the bedding, usually about two thirds of the way back from the bow to the stern. And of course, the shaft and propeller and rudder. And they were very successful. It was a three-horsepower Palmer engine with an enormous flywheel on it. It had a pin that you could pull out of the front of the flywheel and rock it several times and bring it up on the compression and it would start from there. And you could get so good with it that you could operate the reverse of it by pulling the switch off, waiting till it got up to two or three revs, and then come up on the compression and reverse it. They were what we called make-and-break engines, with an igniter in 'em and real often you'd have to take that out and take a file or sand paper and rub the carbon off of that to get it going.

That three-horsepower engine pushed the 25-foot-long, 8-foot-wide skiff about 6 miles per hour. They were very efficient motors.

People back then were mostly dependent on commercial fishing. All of them more or less hunted for their own table, and there was a few that did some commercial hunting all along different places. Ocracoke has been known for a hunting and fishing place all of my time, even back in the early days.

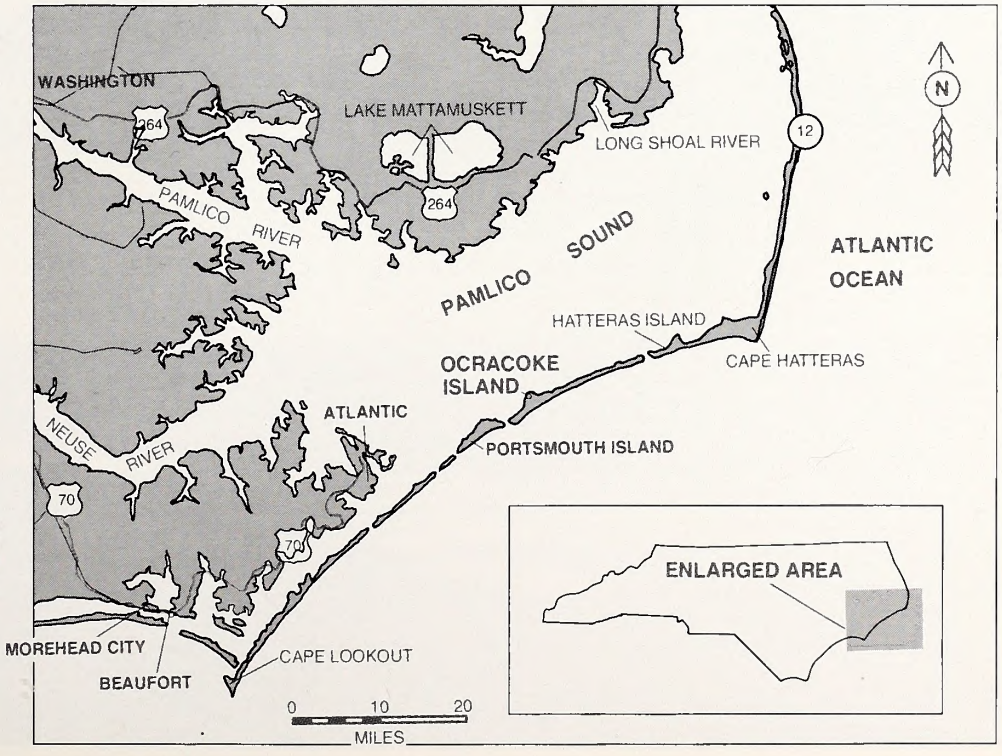
The early commercial fishing back in them days was with pound nets set into Pamlico Sound. All types of gill nets were used, both shallow and deep water, and through the years that has been the typical way of catching commercial fish.

Haul seining has always been a way of life on Ocracoke and along the Outer Banks, but not as much today as in the 1920s to 60s. You would have the dory with the net on the stern and you'd carry the dory on a flat-bed truck and you would back down into the surf, launch your dory and run the net out. One man would stand on the beach and the crew would row the dory out pulling the net, and then they'd circle back almost to the beach. You'd proceed to haul in that end first, then you'd have whatever was there encompassed, and then you'd start shortening. Then later on instead of trying to haul it in by hand, they devised a way of hooking it on to a truck and helping you land the net that way.

And I guess most of the fish I remember in that day were channel bass in the 6-, 8-, 10- and 15-pound range. That was generally from November through February. I think the so-called channel bass may be on the decline along the North Carolina coast. Now we have a limit on the sport fishing side of it. We have an upper limit of two channel bass per person per day, and I'm glad to get that many per day per person. But back in the old days, before there was any thought of a limit, we made tremendous catches of channel bass. They were not wasted. We've always classed it as one of our very good, edible fish. I remember one occasion making a tremendous catch on an October full moon of some 35 big channel bass weighing over 1,100 pounds. Well, to see that none of them fish were wasted, the next day we dressed all of these fish and salted them down, which really came in good that winter for our friends and neighbors.

Fishing was generally seasonal. In the spring of the year you would put in pound nets for shad. And you would always try to get them into Pamlico Sound in February and that was the shad season time of the year, starting in late January, and on into February, March and April. Now these shad were caught in pound nets and these same shad went right on up into rivers like Pamlico River, Neuse River, and all of the inland tributaries of the East Coast.

Then you'd put in what were called summer nets right behind that for trout and croaker. And that would go right on through the summer. Then in the fall you would have a run of flounder and put in flounder nets. That would run through maybe November. Different types of fish would run at different times of the year. So you would pick a lot of gear and different types of nets to keep up if



you were really trying to make a living in it.

Ocracoke's fishermen depended on a market which was mainly out of Washington, North Carolina, and the companies would have sub-buyers on Ocracoke to buy right from the fishermen. To get the fish to Washington, we had a very fine freight boat service to Washington. Captain Cas Williams ran a boat when I was a boy, strictly sail. But the later captains got boats like the Chesapeake Bay bugeyes. They were both sail and motor. They'd take advantage of the wind and sail whenever they could to save fuel, and then of course when they'd becalm they would just start the motor and proceed. The companies had small fish houses out along the edge of the channel where there was deep enough water for the freight boats to dock to unload the ice and load on fish. And these freight boats, as we called them then, would take the fish iced down in hundred-pound boxes back to Washington to the companies that the local men bought for.

I never did do a lot of commercial fishing. Most of my fishing all my life has been party fishing, taking people fishing and also taking them duck and goose hunting. Back in the very early days, we used hand lines. Just a simple piece of line 50 yards long and you would add a heavy lead weight 8 ounces and that lead would be 3 feet from the hook and you have that line coiled up on your hand. If you were down on the ocean side surf fishing you would have a little stick that you would put between your fingers and that stick would be about 6 feet up from the lead. And you'd start swinging that around in a circle, get it going and let it go like you would an apple on a spring stick to get that out the full length of that 50 yards. And then, of course, as you were fishing it, and moving it around, you would coil it back on your hand to make a new cast. Didn't need no reel.

The first reel I ever saw was brought down

Lone surf fisherman *faces gusty November weather along Ocracoke's western shore. The island's long shoreline is a noted rendezvous for vacationers as well as surf fishermen. Except for the village, the island is part of the Cape Hatteras National Seashore.*

here by a man by the name of Frank Kugler and Ford Worthy. Worthy ran a drug store in Washington, North Carolina. Fishermen who came down to the Pamlico Inn had the first rods, I remember. They were very like cane poles.

And I was very fascinated with them and then as time went on we gradually got to buying some of them reels which were very cheap. They began to make a simple reel with just nothing but a thumb leather on it for a drag. Just the handle turned it and that leather drag you'd press onto the line to keep it from burning your thumb when a fish started to run out with the line. And then later on the drag handle came into use. You could buy what they called a drag handle and attach it to this reel and then from that they advanced to built in star drags which we have today. You'd buy a reel then from $5 to $8 to $10. Now you start at $30 and go to several hundred.

As for lures, if you were trolling for bluefish or mackerel, we would use chicken bones or the bone of loons or any hard bone. And you would run a wire through it and take a wire leader and wrap it around your finger, put a little coil in it that would make it pull through the water and kind of wiggle like a fish. You could use feathers, wood plugs, there was just various types of artificial lures and of course bait, like cut mullet, cut menhaden, cut any kind of fresh fish. We also used crabs for bait.

I first started seeing store-bought lures back in the early twenties. You would get catalogues from Sears and Roebuck and places like that and you'd see 'em in the catalogues. But a lot of people just made up their own lures of various types. Anything moving in the water to attract a fish's attention.

I guess over my period of time, there's been hundreds of waves broke into my boat. And I have had a few very unpleasant times where if another one had hit you right at that time it could have sunk you. You have to have a great respect for the water and the ocean and the inlets. You also have to study the weather and the sea.

Today we have radios and radar, so it's pretty good compared to what it used to be. But back then we always had barometers. Any sudden drop in the barometer means approaching low pressure. So we used that, and also your natural instincts of weather watching. See a black cloud rising, most of the time, in summer time, coming from the north west. Mixture of cold air meeting hot air. Seas going from a ripple to big and big and big. That's when you know a squall's approaching.

When you speak of hurricanes, put it this way, they're all bad. But to my knowledge there's never been a person directly drowned on Ocracoke because of a hurricane. Only property damage. And when we say property damage, we mean net property, fishing equipment and all of that. Every hurricane costs no telling how many million dollars along the coast in trade alone.

***Fewer than a thousand people** live on Ocracoke year-round, and most of them live amid the live oak maritime forest near the village. Shingled houses on bricks are evidence of the danger of flooding from storms that sweep over the low-lying island.*

We have to accept hurricanes because they've always been. We're quite familiar with them, their workings and all. Most hurricanes always start with winds from the southeast, from the ocean. And if they stay in that direction too long, it fills up all of the west side of Pamlico Sound, the Neuse River, the Pamlico River, Long Shoal River—the whole west side completely floods. And then there's a sudden change as the winds go to the northeast and end up in the northwest. That is when we would get our highest water. Providing that change came around on the high water on the ocean. If it happened to be on the outgoing tide, it just recedes. But if it happened on high tide, you'd have two walls coming together, the incoming tide and the rush of that excessive water. You would get your highest water right at that point.

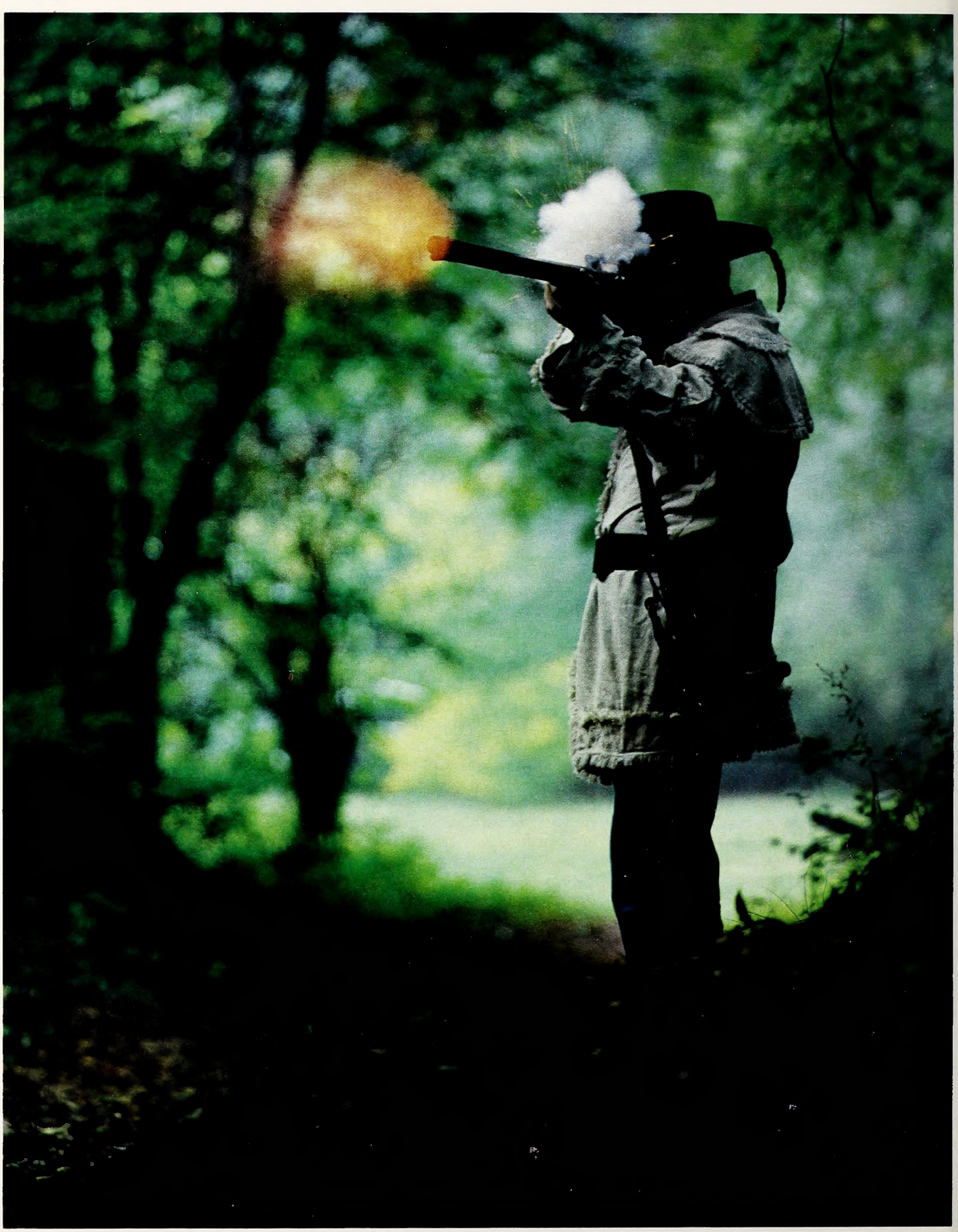
In the last 10 years, I lost a number of customers that started fishing with me back in 1927 and they continued to fish with me, with the exception of the three years during the last world war when we didn't carry on any fishing activities other than some commercial fishing. It makes me sad to see them all passing on, but I guess I'll just have to find some new ones. I'm trying to teach my younger customers to go hunting and fishing as a recreation and as a sport, not to see how much game you can kill or how many fish you can catch. The day may be coming when there will be less if we don't conserve more than we have been doing in my time.

One of the things I liked about the hunting and fishing business was that it was always an occasion for getting up at 5 o'clock in the morning and being out on the water by sunrise. If one only had two hours out of each day to spend, it would definitely be the first hour of the day and the last hour. Since we were married 35 years ago, my wife and I have made it a plan to get out in the afternoons the last hour of the day. She and I have probably seen more sunsets than any couple our age in the United States. They are just enormous and beautiful. You have got to learn to just enjoy the outdoors, the beauty of the ocean, the land, the clouds. I use clouds for my mountains.

I couldn't live inland. Every time I leave the island, even for a visit to see our friends and neighbors, daughters and families and so forth, when I come back from Hatteras I've often remarked to my wife, "Now isn't that the most beautiful place you've ever seen?"

As far as I'm concerned, Ocracoke is the garden spot of the world. It's a great place to be instead of from. ⊠

"Carolina Profile" is a periodic feature in Wildlife In North Carolina. *In these interviews, men and women reflect on their outdoor experiences and on what the land and its resources mean to them.*



John Braxton's Rifles

Not only does this Snow Camp native build his own flintlocks and muzzleloaders, he lives in an area that has strong historical links to the Revolutionary War.

by Mark Taylor
photography by Ken Taylor

The rolling landscape of southern Alamance County has aged gracefully. Dairy farms border twisting, two-lane roads, and woodlots line the creeks and ridges. The land is old and rich in North Carolina history. Whig and Tory bands fought bloody battles here during the Revolution, and less than a century later blue- and gray-coated armies trudged the dusty lanes as the Civil War ebbed and flowed across the South. But for over 100 years now, there have been no battles, and many descendants of the Quakers who settled the region still live on their family lands and can recall bits of family folklore surrounding these events.

John Braxton is one of these. His roots in Alamance County go back to 1756, when an ancestor of the same name was issued a land grant. He has steeped himself in the history of the region, and has made the preservation of the past both his vocation and avocation. He helped found the Alamance Long Rifles—a colonial militia unit—in 1962, and he and his wife Judy also deliver living history demonstrations on blacksmithing, sewing, music and other aspects of colonial life. Professionally, John Braxton is a self-taught machinist and riflesmith who is considered a leading authority on North Carolina long rifles, and whose replicas and restorations of early firearms are among the best in the country. He specializes in weapons built between 1400 and 1865, and regular clients include state historic agencies, museums, and the National Park Service. In addition to being museum quality, a Braxton rifle also "shoots good."

Alamance County riflesmith *John Braxton fires a replica of an early North Carolina long rifle at the site of the Battle of Lindley's Mill, a Revolutionary War battle that took place on a corner of his property.*

John Braxton *engraves his name and rifle number on all of his firearms to show that they are reproductions.*

Several of his long rifles have won national matches held annually in Friendship, Illinois. Sponsored by the National Muzzle-loading Rifle Association, this is the premier event in the world of blackpowder shooting.

When I first visited John Braxton he was fitting the hammer to the lock of a long rifle in the small, one-room cabin that serves as his rifleshop. A soft-spoken man of medium height, he worked with swift, sure strokes of a file, stopping occasionally to check the fit of the hammer to the shaft of the tumbler. This circular part extends through the face of the lock and presses against the mainspring.

"I built my first gun about 35 years ago when I was 15," he recalled as he worked. "I pulled up an iron pipe that we'd been using for years as a horseshoe stake, and realized it was the barrel of an old long rifle. I cleaned it up, and built a lock by trial and error in the high-school machine shop. That was one rough gun. There was very little information available then on building muzzleloaders, but I found one book in the library that showed a picture of an old, wooden gun-barrel drill—you can see one just like it in the gun shop at Colonial Williamsburg. I built a barrel drill from that picture when I was 16 or 17, and have been building and studying muzzleloaders ever since. A lot of these old techniques aren't widely known, and I had to go up to the Ohio area and visit and work with the few surviving, old-time barrel makers and rifle smiths."

He stopped to fit the hammer to the tumbler, driving it on the shaft with a few, sharp raps from a wooden mallet. After filing the surface smooth, he checked the fit of the lock to an inlet cut in a wooden stock blank. It wasn't flush, and he took a small chisel and began removing more wood.

"That old horseshoe stake probably came from a gun similar to this one," he said with a smile. "This is a Jamestown or Guilford County rifle, and is typical of what was used on the North Carolina frontier. Deer hides were the chief export of the Piedmont in the 1700s, and that and problems with Indians made the long rifle the weapon of choice. We know from early census reports and tax records that the Piedmont, especially Guilford and Alamance counties, produced a tremendous number of guns. Jamestown, which is located on the Deep River in Guilford County, was settled by Scotch-Irish, German, and three waves of Quakers from Pennsylvania and Massachussetts in the mid to late 1700s. The river provided good sites for water-powered mills, and the area developed into a major rifle-making center by the early 1800s. Jamestown rifles built by Quaker smiths were sold all over the Piedmont, and many crossed the mountains in the western migration. In fact, there were probably a lot more North Carolina rifles carried in the early West than there were Hawken rifles, although the latter are far better known."

Later, Braxton showed me several original Jamestown rifles and replicas. Typically, the rifles are .33 to .38 caliber, flintlock or percussion, and are half-stocked in red maple. The elaborate brass and silver inlays and patchboxes found on classic long rifles built by German smiths in Pennsylvania and

John Braxton's Rifles

Winston-Salem are missing. Instead, North Carolina rifles are usually unadorned with plain, wooden patchboxes or simply an open, shallow hole bored in the stock to hold greased patches. Braxton attributed these traits to the Quaker influence, and also the frontier economy.

"Many of the long rifles featured in museums were owned by wealthy merchants in urban areas, who wished to display their wealth and used them only occasionally," he said. "This accounts for their good condition and elaborate inlays and engraving. However, this gives us a false impression of what was commonly used. Guns built on the frontier were made at a set price for the common man who couldn't afford much embellishment. In addition, most North Carolina long rifles were used hard and worn out, went West, or were converted to percussion and lost in the Civil War. However, the unadorned North Carolina rifle is probably far more typical of what was used everywhere on the frontier than many museum pieces."

Although Braxton is especially interested in early North Carolina rifles, much of his museum work is building early military firearms. Next to his blacksmith's forge is a machine shop—a large, one-story building filled with massive, World War II vintage metal lathes, planers and drill presses. We walk through the shop to the back corner where two homemade rifling machines, one hand-powered and one electric, sit next to his homemade gun-barrel drill.

"A lot of this machinery hasn't changed much since the beginning of the Industrial Revolution," he said, demonstrating how the hand-powered rifling machine followed a track as it was pulled back and forth to cut the grooves or "rifling" in a gun barrel. "The hand and electric powered rifling machines are basically the same design, and the electric machine is not much different from those used in the early 1800s in the Colt and Whitney gun factories in Connecticut. This machine is powered by an electric motor instead of water or steam. I prefer the hand-powered machine because you have more control over your work and have a better feel for the barrel. Metal has grain and

***Riflesmithing** requires skills in metal and wood working. Here, Braxton checks the fit of a long rifle barrel to a red maple stock. Many colonial gunsmiths also built furniture and clocks.*

"Most of the firearms produced from the 1400s through the 1700s are fairly easy to reproduce because they're hand-forged and simply designed. The firearms produced from the 1800s through the Civil War are a different story."

Braxton's use of machinery doesn't detract from the authenticity of his work. He points out that there was much more specialization and mechanization used in the production of early firearms than most people realize.

"Most of the locks on American guns, for example, were made by specialized firms in Birmingham, England," he said. "These were shipped into American ports by the thousands, and some were even stamped with the names of American makers before being sold to rural gunsmiths. Factory-made gun barrels didn't become common until much later, but it wasn't because the technology didn't exist. Brother Christopher Vogler of Old Salem attached a water-powered, gun-barrel drill to his gristmill in 1796. Shipping costs were prohibitive, though, and most rural gunsmiths continued to hand-forge their barrels until the development of railroads lowered freight rates."

*A **hand-powered** rifling machine follows a track as it cuts the grooves or "rifling" in a gun barrel. With the exception of an added power source, much of this machinery has remained unchanged since the beginning of the Industrial Revolution.*

***Hand-forging a lock** requires many steps, and is difficult and time consuming. Most colonial gun smiths imported finished locks from specialized firms in England.*

Ironically, Braxton says that it is far easier to build a replica of a very early gun, such as a 15th-century Spanish matchlock, than those commonly used in this country prior to the Civil War.

"Producing an accurate replica requires a thorough knowledge of the technology available at the time," he said. "In fact, I'm more interested in the technology used to build early firearms than in the guns themselves. Most of the firearms produced from the 1400s through the 1700s are fairly easy to reproduce because they're hand-forged and simply designed. The firearms produced from the 1800s through the Civil War are a different story. These were products of the Industrial Revolution, and to reproduce them accurately you must tool up your machines the same way. Fortunately, there's a wealth of correspondence, contracts, blue prints and other data on early military firearms in the National Archives from the old federal arsenals at Harper's Ferry and Springfield."

One of the most difficult jobs Braxton has tackled is a replica of a .45 caliber German air rifle carried on the Lewis and Clark expedition. Braxton built it for a state historic site in Nebraska. A series of Hall breechloading rifles for the state of Maine and the National Park Service, and a set of Barbette cannon carriages for a Civil War battlefield state park in Tennessee, also proved to be tough assignments.

"The Hall breechloaders were technically about the most difficult guns I've built," said Braxton. "John Hall was a riflesmith from Maine who patented the first breech-loading rifle in 1811, and he later became one of the top designers at Harper's Ferry. Fortunately, his work is very well documented. The construction of the Barbette cannon carriages was quite a job because they were huge. These were 32-pound cannons, and each carriage was 16-feet long, weighed 8,000 pounds, and had to support a barrel that weighed 10,000 pounds. When I was finished I was a little worried about some checks or cracks in the white oak timbers I'd used, but then I looked at some old Matthew Brady photographs and there were cracks in those too."

Occasionally, Braxton is able to combine his knowledge of gun making with other interests such as archaeology. This was the case recently when archaeologists from the University of North Carolina discovered an early trade gun in an Indian grave during the excavation of the Siouian village of Occaneechi on the Eno River near Hillsborough.

"We don't know much about the trade guns used by the Indians in the Southeast,

character just as wood does, and you sense this while you're working. I've also noticed that when you drill and rifle a bunch of barrels one or two will shoot poorly, most are fine, and a couple will really stand out. There's no apparent reason for this, it's just in the character of the material."

John Braxton's Rifles

although from the writings of John Lawson we know that Indians were using firearms extensively by the late 1600s," he said. "I wanted to recreate this gun for my own pleasure, and see how it shot. I made arrangements to go to the dig and examine the artifacts. There was a rusted lock, barrel, and even a sliver of the red maple stock lying in the grave, and you could tell that the gun had been broken to 'kill its spirit' when it was interred."

The lock was an early "dog lock," the forerunner of the flintlock, and bore the mark of the Royal armory in the Tower of London. The barrel was .55 caliber, smoothbore, and nearly 56 inches long. Fitted with a full stock, the musket was nearly 6 feet long.

"The grave dated to the late 1600s, although the style of lock dated to about 1635," said Braxton. "This musket would commonly have been carried by Indians and many white settlers on the frontier in the 1600s and early 1700s. It was a cheap musket built of surplus parts for the Indian trade when the Royal Army converted its weapons to more modern flintlocks. Still it shot surprisingly well. At 30 yards you could put a round ball in a target the size of your hand, and at 50 yards it threw a three-foot pattern of buckshot. That's about as well as any smoothbore will do, and it certainly would have been an effective game-getter. We also tested the lock using a piece of 17th-century glass, a rock, and a small stone flake. It fired on all three."

Over the past five years, much of John and Judy Braxton's spare time has been devoted to the restoration of their family homestead. The building stood on property owned by someone else, and when they learned it was going to be destroyed they dismantled the building, numbered each piece, and rebuilt it on their property. The homestead was built in 1851, and now stands about 100 yards from the comfortable 100-

***John Braxton displays** reproductions of typical North Carolina firearms in front of his restored family homestead. The Jamestown rifle (left) was built by Quaker, German and Scotch Irish smiths in Alamance County during the mid-1700s through the early 1800s. The Occaneechi rifle (right) is a smoothbore musket that was traded to Indians for furs during the 1600s and early 1700s.*

"There was a rusted lock, barrel, and even a sliver of the red maple stock lying in the grave, and you could tell that the gun had been broken to 'kill its spirit' when it was interred."

Patchboxes and inlays *in Braxton's work reflect regional styles and wealth. Most North Carolina long rifles from rural areas featured a simple patch hole (center) or a wooden patch box (below). Pennsylvania-style rifles made by German smiths in Winston-Salem (above) featured more elaborate and expensive brass patchboxes and inlays.*

A bone nosecap *adds an elegant touch to this long rifle. Many pieces were owned by well-to-do merchants, and such guns survived because they didn't receive hard daily use. Most early North Carolina long rifles were used until they were worn out. Others went west, or were converted to percussion and lost in the Civil War.*

year-old farmhouse where the Braxtons live. It stands on the site of an earlier home owned by the Loftmans who had sold their land to the Braxtons when they moved to Tennessee in the 1820s.

Inside the restored homestead is a simple pine table, a kerosene lamp, and a few benches. On one wall is the signature of the builder, John's great-great grandfather "J. Braxton," disclosed when the wallpaper was removed.

The homestead also provides a link to the Battle of Lindley's Mill, a bitter engagement between Whig and Tory armies that took place on a corner of John Braxton's property.

"We Braxtons have always been big on history, and I heard a lot of stories about the battle when I was growing up," he said. "Let's go down there, and I'll tell you about it."

We walked from the homestead down to Cane Creek. John carried a flintlock Jamestown rifle, explaining that it would have been a typical weapon for each side. Bordering the creek is a small farm road, which was part of the original post road that ran from Wilmington and Fayetteville overland to the colonial capital of Hillsborough. Parallel to the road is a wooded ridge, and we stopped in a small clearing.

"At the time of the battle the land probably looked a lot like it does now," he said. "The area had been settled for some time, and there was the same mix of pasture and woodland."

The battle occurred on September 12, 1781, when the feared Tory partisan David Fanning staged a surprise raid on Hillsborough, and captured the town and the colonial governor. After ransacking the village and freeing 30 loyalists from the jail, Fanning and his men decided to return to Wilmington. However, Robert Mebane, a colonel in the local militia, had ridden to warn Continental General John Butler of the capture of Hillsborough. Butler was encamped with a small force on the Haw River, and hurriedly set up an ambush on the wooded ridge overlooking the ford at Cane Creek. The Tory colonel Hector McNeil fell pierced by three musket balls in the opening volley, but the men were strung out along the road for a long way and Fanning quickly rallied the rear guard. One of the most bitter battles of the Revolution ensued, ending in a draw when Butler withdrew after four hours of continuous fighting.

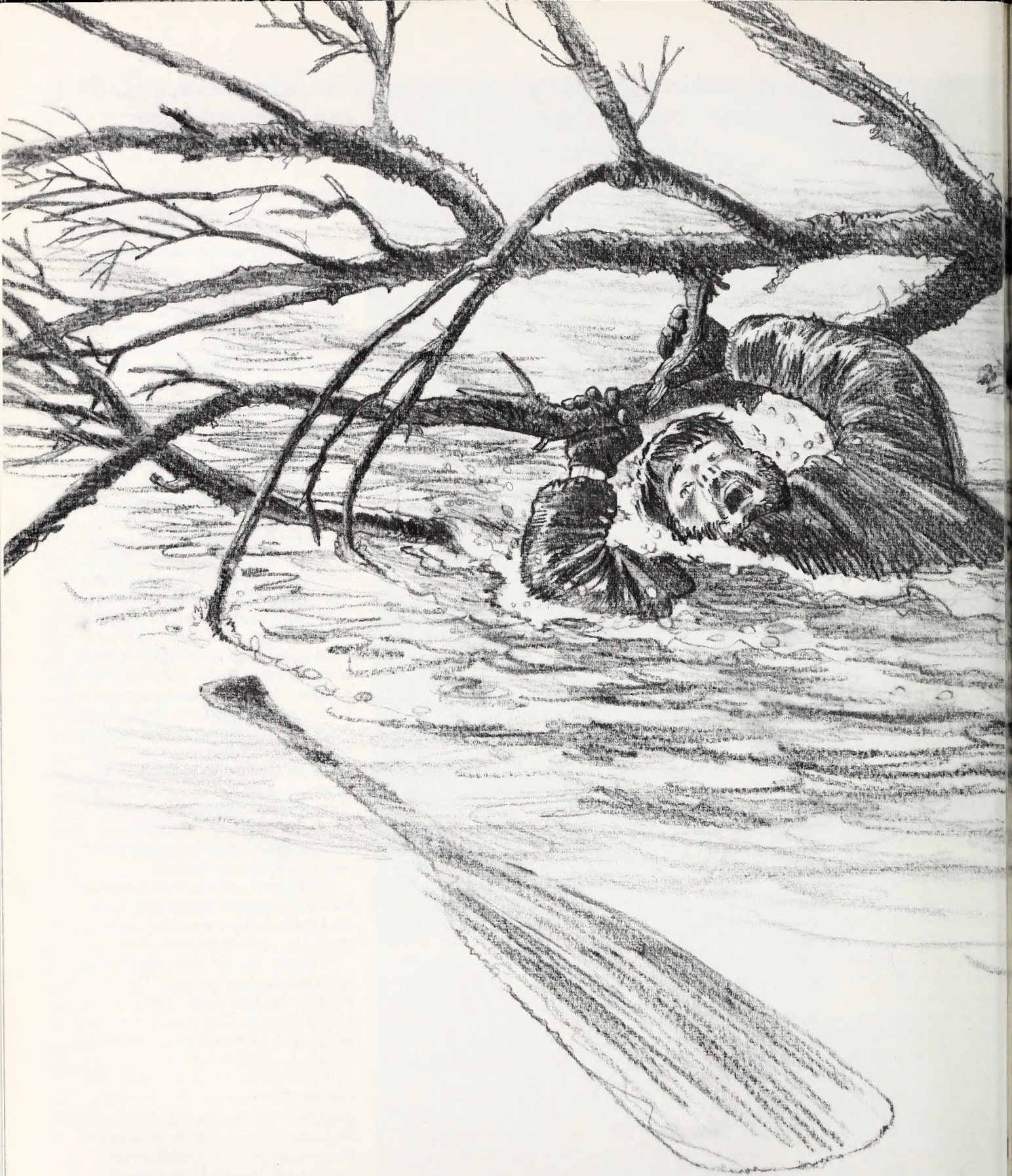
"David Fanning was wounded in that field there," Braxton said, waving back towards his house, and was supposedly so enraged that he cut the head off a dead Continental soldier." He smiled. "That's where all the local 'hant' stories come from.

"In this field is a mass grave. The field was cultivated some years ago so I don't know its exact spot, but my grandfather remembered when it was still tended. After the battle the wounded from both sides were taken to the homes of nearby Quakers. The Loftman house, which stood where I live now, was closest. The men were placed in the loft, and wrote their names in blood on the rafters. My grandfather was born in that house, and he remembered seeing the names as a small boy. Some of the nails and possibly a stair rail from that house were used to build our homestead."

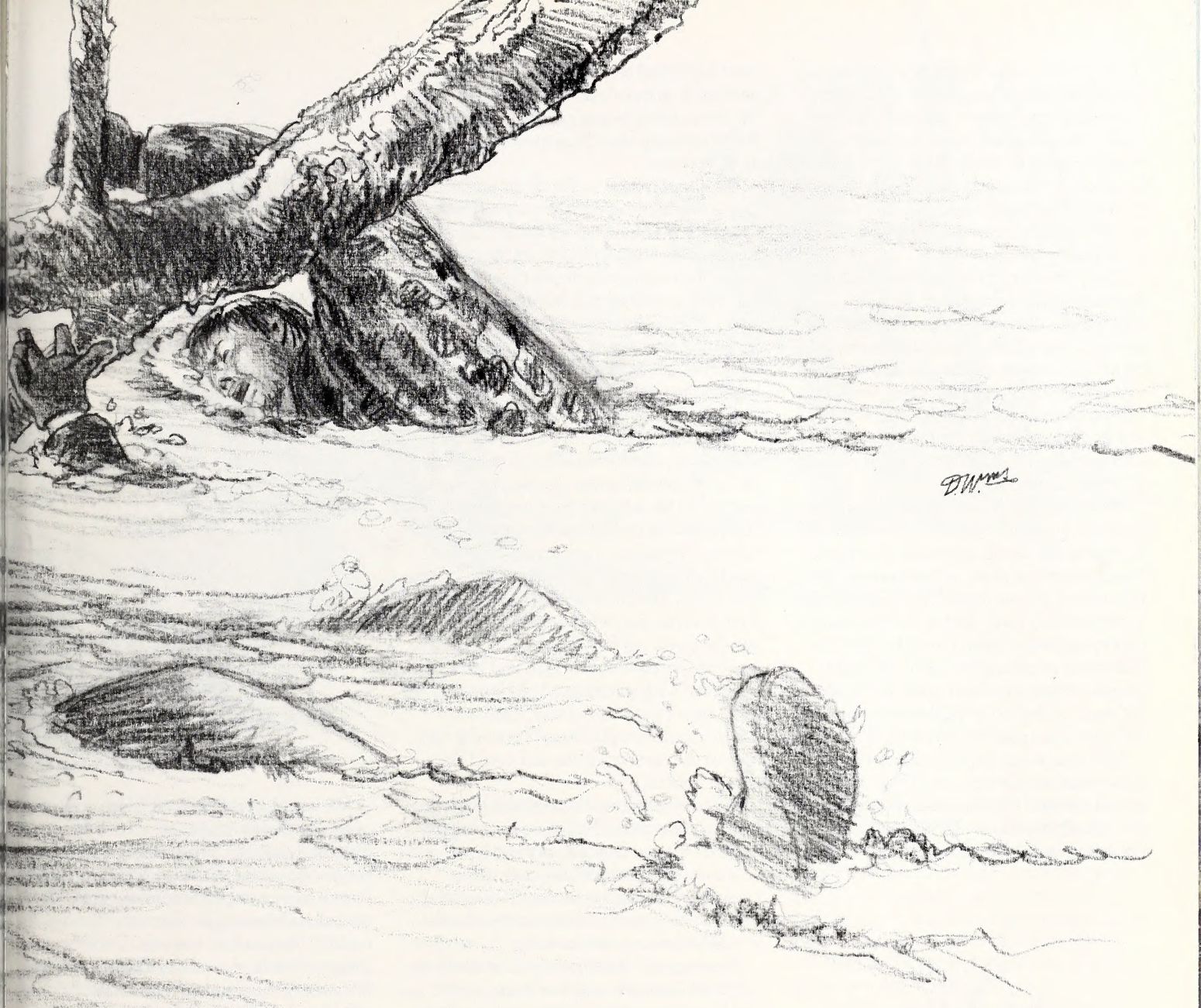
Up the creek a short distance is a small branch. On top of the ridge nearby is a marker which Braxton and his cousin erected to commemorate the battle.

"This was the ford where the heaviest fighting took place," he said. "They say this creek ran red with blood. That's hard to believe, but with a couple of horses down it could well have happened. It must have been bad under that hot sun."

We stare at the trickle in silence. "It's strange," Braxton says, "but the most beautiful metalworking you'll ever see is on weapons. A sword, for instance, has only one purpose and that's to kill, but it's covered with beautiful engraving and handed down through generations. But, have you ever heard of anyone handing down a hoe, or engraving a plow point? I haven't, and there's something wrong there. A plow is just a plain old hunk of iron to people, but it feeds us—it's the staff of life." ⊠



ILLUSTRATED BY DAVID WILLIAMS



The Cold Nearly Killed Me!

My duck hunting companion and I made several simple but critical mistakes that frigid winter day, and it almost cost us our lives.

by Curtis Wooten

Cold water debilitates. It takes your breath, saps your energy, alters your rationality and can kill in 30 minutes or less even if you don't drown. It goes without saying that the waters of the streams, rivers and lakes of North Carolina are cold today. Hunters, fishermen, and others active around water in mid-winter know that, but many of them don't, not really! With modern insulated clothing, most people experience cold only superficially these days. Many read about cold, about hypothermia, and everyone shivers when a cold north wind hits the back of the neck; but a person doesn't really know cold until he takes an unexpected, unplanned, life-threatening dunking in mid-winter.

The events of the morning of January 5, 1974 are etched in my memory. The temperature had hovered in the teens for several days, typical weather for January and February in North Carolina. A friend and I had decided to float part of a local river for ducks. I had canoed the river several times during the fall and seen a few ducks. I reasoned that the cold weather might have forced more into the area.

We arrived at the river not long after sunrise decked out in long-johns, wool pants, layers of shirts, heavy coats, and insulated boots. We unloaded my cedar-canvas canoe from my friend's truck, threw in a couple of flotation cushions and paddles, checked our guns and headed downstream. My companion took the bow-shooting position and I paddled from the stern.

As in dozens of rivers in North Carolina, the water level of the stream we were floating was dam-controlled. On that cold morning, electricity was being generated at maximum capacity upstream and the river was flowing deep and fast. There were few obstructions in the river channel, so there was nothing you could call whitewater, but a paddle plunged into the icy current seemed to vibrate with power.

A few hundred yards downstream from the put-in a small flock of wood ducks rose from a slough on the left bank. My friend fired a couple of shots at them as they flew, but missed. As we neared a bend in the river a few hundred yards farther downstream, a pair of mallards flushed from beneath the alders that overhung the bank. Two shots thundered and a mallard drake fell dead on the water. It drifted along the inside bend of the river as we paddled furiously to catch up.

With our attention focused on the duck as we rounded the bend, we failed to notice an old downed tree that spanned nearly two-thirds the width of the river. Suddenly we were practically upon it. I don't know what my friend thought at the moment, but near panic gripped me. Forgetting the duck, we instinctively began paddling frantically for an opening near the opposite bank, 30 to 40 feet away.

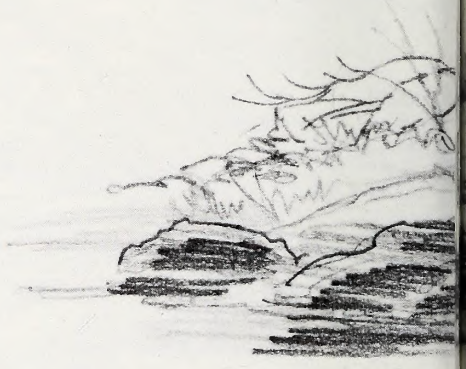
We almost made it. The front half of the canoe was in the open when a snag caught the canoe gunnel at center thwart. Quicker than it takes to read these lines the current rolled the canoe underneath the snag, dumping us and all our gear into the frigid water. The canoe caught on submerged limbs and the current crushed it like a matchbox. Life preservers, paddles, my new hunting hat—all floated off downstream. Guns disappeared in the murky water.

The thing I remember most about those first few seconds, even after 13 years is the shock of the cold water. It was numbing. It seemed to force the air from my lungs and I couldn't seem to draw another breath. Somehow my friend and I wound up a few feet apart, hanging onto the broken snags of the tree limbs. The current was so strong it stretched our feet out downstream, almost parallel to the surface. The trunk of the tree was only partially submerged and led to the bank, but with waterlogged clothing, and the game bag of my hunting coat filled with water, I could not pull myself onto the tree against the current. It was all I could do just to hold on.

After what seemed an eternity, but was probably less than a half-minute, it became obvious that we had only one option. I yelled above the roar of the river to my friend that I was going to turn loose and try for shore. He nodded, and shouted that he would follow in a few seconds.

Moving with the current was easier than fighting it, but the weight of heavy boots and layers of waterlogged clothing made it nearly impossible to keep my nose above water. In several places the river was shallow and my knees touched bottom as I was swept along, but I could not gain footing to stand in the current. A hundred yards or more downstream I finally managed to grab a low-hanging alder branch and pull myself to shore. Looking over my shoulder, I saw my friend drifting down behind me, treading water. Numbly I grabbed a dead branch from the river bank and leaned out to get it within his reach. He finally grabbed it and I pulled him to shore. Exhausted, we crawled up the bank.

It was several minutes before either of us spoke and, interestingly, the first words we uttered were attempts at humor—something like, "Now ain't this a heckuva fix we've gotten ourselves into." It wasn't until several years later that my friend confided that he didn't think he would have made it had I not extended that limb to him.



We were lucky, very lucky. Had any of several things happened only slightly differently, we would have been figures in the 1974 boating accident statistics. Though I was a fairly competent canoeist at the time, we had no business on that river that day. It was too big, too fast, too cold. To compound things we were not wearing PFDs (personal flotation devices). I know now that the ones you sit or kneel on are never available when you really need them.

Once on the river, we also didn't pay enough attention, and it was blind luck that kept us from being entangled in the canoe or the tree limbs and drowning on the spot. When we made it to shore our clothes were soon stiff with ice, but we had no dry matches to start a fire. It was "luck" that swamped us close enough to walk back to our truck for a change of dry clothes before our body temperature dropped to critical levels.

I relate this experience because it could happen to any of the thousands of hunters, fishermen, canoeists and other boaters who use the waters of North Carolina during the winter months. Some are beginners who have put little thought into the special hazards associated with winter boating. Others may be experienced boaters, but with a tendency toward carelessness. Many also aren't aware that the rate is lowest, but

fatalities highest, for boating accidents during the winter months. Furthermore, a high percentage of those deaths are from cold—hypothermia—rather than drowning.

In 40 degree Fahrenheit water, you have less than 30 minutes before total exhaustion or unconsciousness sets in, and only 15 minutes or less before you lose the ability to make rational decisions to save yourself. In less than an hour in 40 degree water you will die.

There are a few basic rules that anyone active around water in winter should observe.

- Always tell someone exactly where you're going and when you expect to return. In case rescue is needed this information provides search parties a place to start and often saves critical time.
- Know the character of the stream or lake you're boating and be realistic, even conservative, about your boating skills. Know the limits of your boat.
- Stay close to shore on lakes so that if you should swamp you can make it to shore by yourself. Remember that in frigid water you may have as little as 15 minutes to save yourself, and there is little chance of rescue by other boaters.
- Watch the weather because winter storms can arrive abruptly and kick up waves on lakes that can easily swamp a boat.
- Don't overload your boat. Two men, a retriever, three dozen decoys, a motor and other gear is a heavy load for most boats. Make two trips if necessary.
- Carry a change of dry clothing, including head gear, and matches or other fire-starting material in a waterproof container. (A metal military ammunition box works well as a "dry box," but it may not be in reach if you have an accident.)
- Keep dry matches in a waterproof container on your person. What you have on your back may be all that makes it to shore. Wear as much wool as possible, because it retains some of its insulating properties even when wet. Some synthetics, like Thinsulate, also retain warmth when wet. Down garments, super-warm when dry, are virtually useless wet.
- Remember that streams and rivers change their nature dramatically at different water levels—avoid those that are unfamiliar. Also, wait until spring to develop canoeing skills because, for many beginners, canoes are unstable.
- Remember when floating a stream in a john boat that these boats have a tendency to swamp from the rear when stopped in the current by an obstacle.
- Stay with a swamped boat and work it to shore if possible. Studies have shown that the average person swimming in a life jacket cools 35 percent faster than when remaining still, and in winter boating accidents it is more often hypothermia, not drowning, that kills. Good judgment is required before deciding to try to swim for shore. In 50 degree water, a person of average swimming ability can swim no more than three quarters of a mile before being incapicitated by hypothermia—far less in colder or rough water.
- Avoid alcohol because it impairs reasoning and motor skills and increases the chances of an accident. (About one third of boating fatalities involve significant alcohol impairment).
- Make sure your boat motor and other equipment are in good working condition. A stalled engine in choppy water can be dangerous.
- Finally, **always** wear a PFD and learn to recognize, protect against and treat hypothermia in yourself and companions. (Mustang Marine Wear has an excellent brochure on hypothermia and cold water survival. It is available at no cost, at P.O. Box 5344, Bellingham, Washington 98227).

Winter canoeing, duck hunting and fishing are activities I still enjoy, but today, more than 13 years later, I am realistic about the hazards and, I hope, better prepared for accidents should they occur. I don't like trusting my life to the whims of lady luck, and I'm sure you don't. ⊠

Guidance For Nongame

Seventeen North Carolinians with broad and varied backgrounds in wildlife will help chart the future of the Wildlife Resources Commission's nongame and endangered species program.

by Mark Taylor

In years to come, North Carolina's nongame and endangered wildlife species may date their improved status to two events of the mid-1980s. One was the legislation passed by the N.C. General Assembly in 1983 authorizing the Nongame and Endangered Wildlife Fund and a nongame tax checkoff on the state tax returns. The nearly $1 million generated by the checkoff in three years has been targeted specifically for nongame programs.

The other event is the recent appointment of the second North Carolina Nongame Advisory Committee by the N.C. Wildlife Resources Commission. The 17-member panel was selected from nominations presented by conservation organizations and the scientific community across the state, and held its first meeting in Raleigh on November 10.

"The purpose of this committee is to serve as a link between nongame wildlife interests and the public, and to help guide the continued development of our nongame and endangered wildlife program," said Richard B. Hamilton, assistant director of the Wildlife Commission. "The Wildlife Commission has always been responsible for the management and protection of all wildlife in the state, and nongame wildlife has benefitted from much of the work directed at game species. With the creation of the North Carolina Nongame and Endangered Wildlife Fund, however, the means became available to develop programs specifically for nongame wildlife. Much of the early work involved basic surveys. We'd like to broaden our nongame program in the future, and this committee can help us investigate and set priorities for nongame research and management."

Elected chairman of the committee was Dr. James Parnell, professor of biology at the University of North Carolina at Wilmington. Parnell believes that the panel's primary role will be to involve the Wildlife Commission more heavily in the conservation and management of nongame and endangered wildlife in the state.

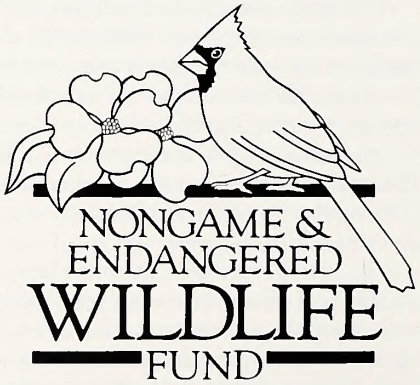
"The Committee has identified a number of areas where it could play a role," he said. "One is finding additional sources of funding for nongame programs. Since many of the committee members are biologists, we can also offer information and assistance in developing priorities for nongame research and management. Nongame education is another important area. And, of course, the committee will serve as a link between the groups interested in nongame wildlife and the Commission."

Parnell points out that most of the state's conservation groups are represented on the committee, and he anticipates working closely with them in the future.

Hamilton echoed the cooperative theme by saying that the success of the nongame tax checkoff—contributions have increased each year—attests to citizens' high interest in nongame wildlife. "There are many people who don't hunt or fish but are interested in wildlife," he said, "and this committee will offer them additional opportunities to become involved in wildlife conservation programs."

Dr. Parnell is well-known for his research on the populations and ecology of coastal birds. He developed a management plan for water birds in North Carolina, and also served on the first nongame advisory committee. In addition, he is a long-time and active member of the Carolina Bird Club, National Audubon Society, and the Lower Cape Fear Bird Club. He enjoys bird-hunting, fishing, and wildlife photography.

Other officers elected by the panel were Dr. Tom Quay, vice chairman, and Chuck Roe, secretary. Dr. Quay is a retired



Don't forget nongame and endangered wildlife when you're filling out your tax forms this year.

The key to the efforts of the N.C. Nongame Advisory Committee and Commision nongame biologists is the money generated by the nongame tax refund checkoff. If you are receiving a tax refund from North Carolina this year, look carefully at line 23. This is where you can designate a portion (or all) of your refund to go to the North Carolina Nongame Wildlife Fund. This donation will not increase the tax you pay. If your tax returns are prepared professionally, tell your accountant that you wish to contribute to the Fund.

If you aren't receiving a refund but wish to contribute to the Nongame Wildlife Fund, tax-deductible contributions may be sent to the N.C. Wildlife Resources Commission, Nongame Wildlife Fund, 512 N. Salisbury St., Raleigh, NC 27611. Please note on your check that the contribution is for nongame and endangered species.

DEBBIE CONGER

***The Wildlife Commission's** Nongame Advisory Committee held its first meeting on November 10. Seated, from left to right, are Dr. Tom Quay, vice-chairman, Dr. James Parnell, chairman, and Chuck Roe, secretary. Standing, from left to right, are committee members Dr. Les Brown, Dr. Gary San Julian, Dr. Michael Baranski, Dr. Charles Manooch, Tom Ellis, John Connors, Harold Davis, Dr. Steven Everhart, Melanie Wells, Dr. Peter Weigl, Dr. Frank Quick, and Dr. J. Frank Randall. Unable to attend was Joe Jacob.*

ornithology professor at N.C. State University, and represents the Sierra Club. Mr. Roe is coordinator of the Natural Heritage Program for the N.C. Division of State Parks and lives in Raleigh.

Other committee members are as follows:

- Dr. Michael Baranski of Salisbury is a biology professor at Catawba College, and is an enthusiastic outdoorsman and naturalist.
- Dr. Les Brown of Boiling Springs is a biology professor at Gardner-Webb College, and represents the Sierra Club.
- Dr. Richard Bruce of Highlands is executive director of the Highlands Biological Station, and is also a biology professor at Western Carolina University.
- John Connors of Raleigh is the city naturalist for the Raleigh Department of Parks and Recreation, and represents the National Audubon Society.
- Harold Davis Sr. of Wilmington represents the Telephone Pioneers of America, an organization of active and retired telephone company employees that has been very active in wildlife conservation in North Carolina.
- Tom Ellis of Raleigh represents the N.C. Museum of Natural Sciences.
- Dr. Steven Everhart of Buies Creek is a biology professor at Campbell College who has worked with coastal birds and woodpeckers.
- Joe Jacob of Pittsboro represents The Nature Conservancy, and is regional director for their Preserves Selection and Design Section.
- Dr. Charles Manooch of Morehead City is a fisheries biologist with the National Marine Fisheries Service, and is president of the N.C. Wildlife Federation.
- Dr. Frank Quick of Mars Hill is a biology professor at Mars Hill College.
- Dr. J. Frank Randall of Boone is a biology professor at Appalachian State University, and is active in The Nature Conservancy and the National Audubon Society.
- Dr. Gary San Julian of Raleigh is the wildlife extension specialist for the N.C. Agricultural Extension Service, and also represents the N.C. Wildlife Federation.
- Dr. Peter Weigl of Winston-Salem is a biology professor at Wake Forest University, and is well known for his research on fox and northern flying squirrels.
- Melanie Wells of Greensboro operates the Owl's Roost Wildlife Sanctuary, and is president of the N.C. Wildlife Rehabilitators Association.

"We're very pleased with the caliber of the individuals serving on this committee," said Hamilton. "They are not only dedicated, but have the background to provide a lot of technical assistance to our nongame wildlife program. We look forward to working very closely with them in the future." ⊠

Wildlife Endowment Fund Passes A Milestone

Governor Martin Honors Goldsboro Couple

Written and Edited by Mark Taylor

Thirteen-month old Roger Dale Kent, Jr., of Greensboro stole the show when Governor James G. Martin commorated the North Carolina Wildlife Endowment Fund's passage of the $5 million mark at a meeting of the N.C. Wildlife Resources Commission in Raleigh on November 10. U.S. Air Force Sergeant Roger Kent and his wife Mary, parents of the child, were honored by Governor Martin for their purchase of an infant lifetime sportsman's license.

"Today, it is with a great deal of pride and pleasure that I announce that the Wildlife Endowment Fund has again passed a milestone," said Governor Martin as he presented a commemorative plaque to the couple. "The purchase of a lifetime sportsman's license by Mr. Roger Dale Kent of Goldsboro for his son represents the $5 million point of the Wildlife Endowment Fund.

"Mr. Kent, you probably had no idea that your purchase of a lifetime license for your son would create all this celebration. We are extremely proud of the Wildlife Endowment Fund and the support that you and other sportsmen are giving this fund. It is most appropriate that this honor go to you because what you have actually done represents the passing of the stewardship of our hunting and fishing heritage to a future generation. As parents, I'm sure that you and your wife will be pleased to know that a portion of this money will be used for youth-involvement programs, the printing of educational materials, and the placing of *Wildlife In North Carolina* magazine in school libraries. The Wildlife Endowment Fund is a most successful and innovative fund-raising program, and I'd like to express my appreciation to the Kents and everyone else who has played a part in this highly successful program."

Roger Kent is a native of Hot Springs in Madison County, and his wife Mary is from nearby Marshall. He is stationed at Seymour Johnson Air Force Base, and has lived in Goldsboro for the past three-and-a-half years.

"I've always enjoyed hunting and fishing, especially deer hunting and bass fishing, and we felt that buying a lifetime license for our son would be a good investment," said Kent. "We're pretty sure that he will want to hunt or fish when he grows up, and even if he doesn't it's worthwhile because this will help wildlife conservation in the future."

DEBBIE CONGER

In The Spotlight: *North Carolina Governor James Martin recently honored Roger and Mary Kent of Goldsboro for their purchase last summer of an infant lifetime sportsman's license for their son, which helped push the Wildlife Endowment Fund over $5 million. From left to right are District 3 Wildlife Commissioner Eugene Price of Goldsboro, Mary and Roger Kent holding their son, Roger Jr., Governor Martin, Jerry Wright of Jarvisburg, chairman of the N.C. Wildlife Resources Commission, District 5 Wildlife Commissioner Eddie Bridges of Greensboro, and Charles Fullwood, executive director of the N.C. Wildlife Resources Commission.*

Field Notes

Rabbit season open through February 28. Daily bag limit of five with a possession limit of 10.

Quail season open through February 28. Daily bag limit of 10 with a possession limit of 20.

Grouse season open through February 28. Daily bag limit of three with a possession limit of six.

Public Hearings For Proposed Changes in 1987-88 Hunting, Fishing and Trapping Regulations. All hearings begin at 7 p.m.

- North Stanly High School in Albemarle on Monday, February 9.
- Swain County Courthouse in Bryson City on Tuesday, February 10.
- Wilkes County Courthouse in Wilkesboro on Wednesday, February 11.
- Morganton Civic Center Auditorium in Morganton on Thursday, February 12.
- Old Cumberland County Courthouse in Fayetteville on Monday, February 16.
- Alamance County Courthouse in Graham on Tuesday, February 17.
- Old Chowan County Courthouse in Edenton on Wednesday, February 18.
- Craven County Courthouse in New Bern on Thursday, February 19.
- Johnston County Courthouse in Smithfield on Monday, February 23.

Caught By Raleigh Angler

Kerr Lake White Bass Certified As World Record

North Carolina is now the home of the world record white bass. A 5-pound, 14-ounce fish caught in Kerr Lake on March 15 by James King of Raleigh was recently confirmed as the new, all-tackle world record for this species by the International Game Fish Association.

"I do a lot of winter fishing for stripers in Kerr Lake, and usually do pretty well," said King. "I caught this fish by accident. I was fishing for stripers, and had caught quite a few, when the fish hit. I thought I'd hooked a small striper, and landed it in about one minute. When I brought the fish aboard, I could see it was no striper but a white bass. There are quite a few white bass in Kerr Lake, but most of the fish weigh under 2 pounds. I've also fished Fontana Lake which has a reputation for big white bass, so I knew the state record weighed about 5 pounds. This was by far the biggest white bass I'd ever seen, and I was fairly sure it was a new state record.

"I took the fish to a nearby grocery store to have it weighed on certified scales, and the store owner didn't want to do it because he thought it was just another small striper. I convinced him, though, and we weighed, measured and photographed the fish. The fish was 22-inches long and had a 17-inch girth. Then, I put the fish on ice and had its identity confirmed by biologists with the N.C. Museum of Natural History and the N.C. Wildlife Resources Commission. Joel Arrington, former outdoor editor for the N.C. Division of Travel and Tourism, accepted the application for the state record and helped submit it to the International Game Fish Association as a world record, which is a fairly complicated process."

King caught the fish on a homemade, white, lead-headed, hair striper jig baited with a 4-inch, white plastic worm. He was using 14-pound test line.

"I had the fish mounted, and the taxidermist did a beautiful job," said Smith. "I'm a serious fisherman, and it's very satisfying to look at the wall and see a world record."

Smith's fish replaces a 5-pound, 9-ounce world record white bass caught from the Colorado River in Texas in 1977. The former state record was a 4-pound, 15-ounce fish caught from Fontana Reservoir in 1966 by Leonard Williams.

Number One: *This 5-pound, 14-ounce white bass caught in Kerr Lake by James King was recently confirmed as a new world record. King was winter fishing for stripers when the fish hit.*

Tax Checkoff Continues To Grow

Future Brighter For Nongame Wildlife

The future for nongame wildlife is getting better every year judging from contributions to the North Carolina Nongame and Endangered Wildlife Fund. Since the fund was created by the General Assembly in 1983, contributions have totaled approximately $850,000. These contributions come largely through a checkoff for the fund on state income tax returns. The projected total for the 19865-87 fiscal year is over $290,000.

"North Carolina is the only state in the country which has had contributions to the checkoff continue to increase every year, and that's great news," said Debbie Paul, section manager of the Commission's Nongame and Endangered Wildlife program. "In other states, contributions have leveled off or actually declined after a couple of years."

The Nongame and Endangered Wildlife Fund supports a wide range of projects. For example, this fund helped buy four tracts of bottomland hardwood forests on the Roanoke River. Management of endangered loggerhead sea turtles, restoration of endangered bald eagles and peregrine falcons, and the introduction of Project WILD and other conservation education programs into the schools are also being supported by this fund.

"We'd like to thank everyone who has contributed in the past, and urge everyone to contribute to the Nongame and Endangered Wildlife Fund when they fill out this year's state tax return," said Paul. "Information on the fund can be found in the instructions accompanying your state tax return. Please give freely—nongame and endangered wildlife need our help."

Rabbit Good Winter Fare

February brings bitter weather, and there's no better supper on a cold winter day than rabbit.

The premier rabbit hunter in the Wildlife Commission headquarters in Raleigh is probably Melvin Jones, who handles the mail for the Division of Administrative Services. Here are two of his favorite rabbit recipes, which originated from his aunt, Mrs. Flonia Brooks.

Fried Rabbit

Soak whole or cut-up young rabbit in salted water overnight. Remove from water, pat dry, and place quarters or smaller pieces in a bowl with one egg. Mix with egg, and add flour until the batter covers the pieces.

Fry in shortening or oil in a covered pan on medium heat. Remove cover for last 15 minutes and finish cooking.

Barbecued Rabbit

2 rabbits
1 cup water
1 cup vinegar
½ cup butter or margarine
salt and pepper to taste

Soak rabbits in salted water overnight. Place rabbit pieces in roaster or covered pan. Add all ingredients and cook in oven at 350 degrees for 1½ to 2 hours (larger rabbits take longer). Add Texas Pete or your favorite barbecue sauce for the last 15 minutes if you prefer.

Deer Too Close For Comfort

Every hunter spends a lot of time trying to get close to game. But, there's such a thing as getting too close, as Wildlife Commission fisheries production coordinator Mallory Martin of Waynesville discovered last fall.

"I was deer hunting during the early bow season and got tired of sitting in my stand," Martin recalled. "So, I came down and decided to scout around. I walked up a game trail to an area where there was a lot of deer sign, and sat down for a rest."

Martin leaned back against a tree, scanning its upper branches for acorns, and stretched his legs across the trail. He heard a noise but figured it was another hunter, and continued to check the acorn crop.

"The noise kept coming, and when I looked up there was a big, six-point buck about 20 feet away walking down the trail. I stayed perfectly still, and he kept coming. He stepped over my front legs and then stopped and froze. The deer was literally in my lap. He knew something was wrong, but I was wearing complete camouflage and the wind was blowing away from me. My bow was lying beside me, but I didn't dare move."

After an eternity—which Martin figures was really about a minute—the deer stepped over his legs, walked down the trail about 30 feet, picked up his scent, and spooked.

"He was gone so quick I never got a shot, but mostly I was just glad he wasn't standing on top of me anymore," said Martin. "I guess he thought I was part of the tree, and my biggest fear was that he was going to start scraping his antlers against me. Actually, that was my second biggest fear."

Snowy Egrets Featured

Peterson Print Donated

DEBBIE CONGER

***Dr. Tom Quay** (left) of Raleigh recently donated this print of a pair of snowy egrets by Roger Tory Peterson to the Wildlife Commission in memory of his wife, Violet Wells Quay. Here, Jerry Wright of Jarvisburg, chairman of the Commission, accepts the print. Dr. Quay was also recently elected vice-chairman of the Nongame Advisory Committee.*

Poachers Get Geography Lesson

Summer Coon Hunt A Mistake

Raccoons don't always pick the right tree to climb when a dog pack is chasing them. Several raccoon poachers learned this the hard way one evening late last summer.

Wildlife enforcement officer Steve Morrison, who lives near Asheville, had just settled in on his back porch to watch the sun set when he heard a pack of coon dogs open up off in the distance. He sat up momentarily, but then relaxed because it was the training season and many hunters were out at night running their dogs in preparation for the season opening. The race came his way, and the coon treed right across the river which ran directly behind his house. By now it was pitch black, and after a few minutes he heard voices. Surely, he thought, the men were just training their dogs.

Crack. A rifle shot split the night air. Instantly, Morrison was on his feet. He slipped off his porch, forded the river, and eased down through the treeline until he was within an arm's length of the men. They were so preoccupied with dangling the dead coon over their hounds that they never heard him.

Suddenly, the beam from Morrison's flashlight stabbed through the darkness and the poachers' heads jerked up as they realized they'd been caught red-handed.

"Boys," Morrison said with a smile, "it isn't nice to poach in the game warden's back yard."

—Jay Davies

Wildlife Helps Teach Science

The expression, "Aw nuts," may seem outdated in today's electronic age, but for high-school students participating in Western Carolina University's MicroNet program it's very update. Students using the MicroNet program—which links science classrooms with the faculty, library and other resources at Western Carolina University—have helped evaluate the "mast" or acorn crop for wildlife in their areas.

"We had six schools involved this year in the mast survey," said Dr. Jerry West, assistant professor of biology at Western Carolina University. "The students assessed the fall crop of acorns and nuts in the field, and then forwarded the information by computer to John Collins, big game project leader for the Wildlife Commission."

Collins added, "The information supplied by the MicroNet program has expanded our data base. Mast is an important food for black bears and many other wildlife species. We've been conducting annual mast crop surveys for many years."

The primary purpose of the MicroNet program is education. About 75 high schools participate, and students may use MicroNet to take university courses and tests, correspond with faculty, and participate in actual research.

"All too often, students think science is boring and irrelevant," said Linda Perry, MicroNet director at Western Carolina University. "By involving students in scientific research such as the mast survey in their own communities, we hope they will become interested in science and see how it affects their lives."

—Jay Davies

Part Of Muskie Research Project

Fishermen's Diaries Tell True Tales

Dear Diary:

Caught a big muskie on a live shiner in the French Broad today. What a fight. He was lying next to a sunken log in a long pool and hit just before sundown. Weather was overcast, water temperature 56 degrees, air about the same...

This entry is typical of the information that biologists are using to learn more about muskies in North Carolina. Recently, a number of avid muskie fishermen were selected to participate in a three-year, muskie-angler diary project.

"We began this project last summer," said Jim Borawa of Asheville, mountain region fisheries research coordinator for the Wildlife Commission. "We have very little information on fishing success rates for muskies in North Carolina, and the angler diary project is one of the best ways to collect this data. We plan to involve about 30 fishermen on Lake Adger and the French Broad, Nolichucky and New rivers."

Participating anglers keep detailed notes on the size of fish caught, hours fished, weather conditions, water temperature, lures or baits used, and time of day when the fish was caught.

"This information can tell us a lot," said Borawa. "For starters, we want to learn more about the basic success rates in these waters. The national average for muskies is one fish caught per 100 hours of angling, but we think the catch rate in North Carolina may be higher. We're also using our new computer to compile data on weather and water conditions, as well as baits or lures used, time of day, and the season when fish were caught. This information will help us manage muskies, and will also help anglers."

The project will also help determine whether muskies are reproducing in our waters. "All of the muskies that have been stocked since 1983 have been marked by fin clipping and this information will be included in the angler diaries. This will give us a much better handle on the rates of natural reproduction.

KEN TAYLOR

Something To Remember: *Avid muskie fishermen are now keeping diaries as part of a cooperative research project with the Division of Boating and Inland Fisheries. They shed light on angler-success rates and the best times and weather conditions for fishing.*

We know that there has been some natural reproduction in the French Broad River, but we don't have enough information to tell on Lake Adger and the New and Nolichucky river systems."

Animal Careers Program Offered

Interested in working with animals? The Technical College of Alamance in Haw River recently developed a curriculum in Animal Care and Management Technology.

The curriculum includes courses in animal welfare, care, behavior, management, and restraint, and is designed to prepare students to work with humane organizations, city or county animal-control agencies, or state and federal agricultural agencies.

For further information contact Sandy Brownstein, Technical College of Alamance, P.O. Box 623, Haw River, N.C. 27258.

The Wildlife Endowment Fund Report

The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife In North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Status on September 30, 1986

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	21,459	$6,418,706.89
Lifetime Hunting License	144	29,305.23
Lifetime Fishing License	1,342	241,098.34
Lifetime Subscriptions to Wildlife in N.C.	823	101,038.19
Contributions	—	77,568.34
Fund Total		$6,867,716.99
Total Interest Earned	$1,051,073.12	

Squirrels Tops For Beginners

Dear *Wildlife*:

I really enjoyed your article "Bonus Bushytails." I thought it was very interesting because I go squirrel hunting myself. I agree with you 100 percent about taking a beginning hunter squirrel hunting instead of deer hunting. I started out squirrel hunting and I thought it was very exciting because we got a couple of squirrels the first time out!

Keep up the good stories!

—Jennifer Gantt
Statesville

Calendar Of Events

February 11
Third annual banquet of the Charlotte Chapter of the National Wild Turkey Federation at the Radisson Plaza Hotel in Charlotte. Proceeds benefit wild turkey management in North Carolina. The cost of the banquet is $35 per person (includes membership in the Federation) or $20 for members.

February 13-15
Southeastern Wildlife Exposition in Charleston, S.C. Features some of the finest wildlife art and carvings in the nation. For more information contact the Southeastern Wildlife Exposition, Dept. G, 237 King St. Charleston, S.C. 29401

March 6-8
Annual Convention and Governor's Awards Banquet of the N.C. Wildlife Federation at the Marriott Hotel on Hwy. 70 west in Raleigh. For more information contact the N.C. Wildlife Federation, P.O. Box 10626, Raleigh, N.C. 27605.

THE BEST OF ALL OUTDOORS...

The 1987 Wildlife Calendars have arrived.

Larry Barton, Bob Dance, Sallie Middleton, Bob Henley, and Alan Cheek are among the artists featured this year. You will also find information about wildlife, hunting seasons, boating access areas, ferry schedules, and much more.

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JOEL ARRINGTON

Gaudy Birds

Wood ducks survey their pond home. The colorful male is surely the sportiest dresser of all North Carolina's ducks.

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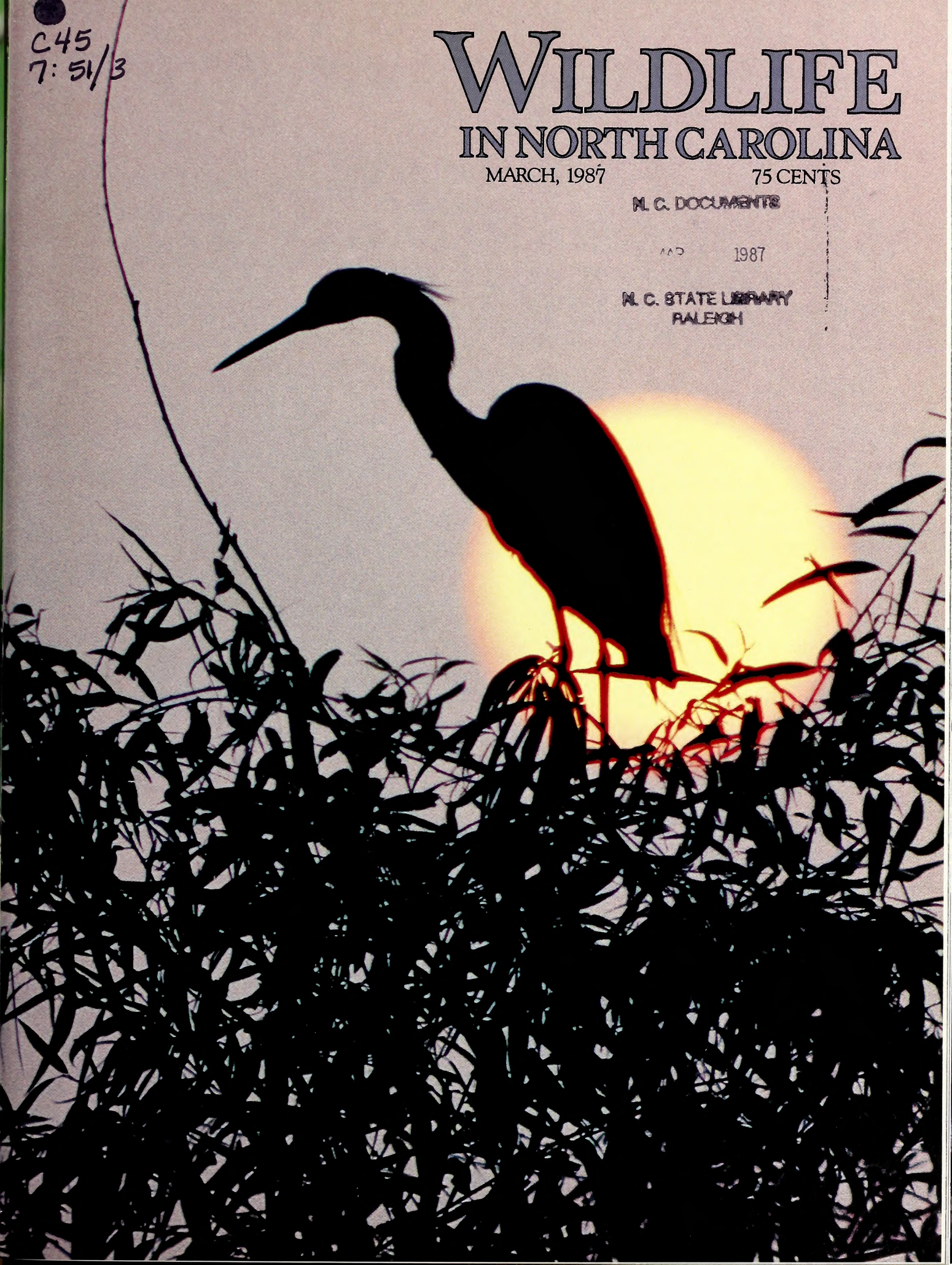

Just Once A Year

by Jim Dean

There aren't many certainties in life, but I think I can come close with one prediction. Although I may not know where I'm going to eat lunch tomorrow, I've got a pretty good idea where I'll be the first Saturday each April for the rest of my life. In case you haven't already figured it out, that's the traditional opening day of the trout season in North Carolina.

In the midst of January as this is being written, it is very easy to let your mind drift into the mountains to a little cabin perched on a hillside overlooking a tumbling stream. Indeed, it is impossible to keep it from making such a journey. It will still be a bit chilly, of course, but you'll pass bright splashes of yellow forsythia that warm the heart as you drive out of winter.

JACK DERMID

I always arrive a day early to freshen the mouse poison and open the curtains to let in the slanting, dust-flecked shafts of pale sun. Friends begin to arrive in late afternoon, and the traditional oyster stew will be cooked on the wood stove in a kitchen as hot as a nursing home. Someone will add a bit of crumbled red pepper to the stew, invariably a bit more than would have been prudent.

After months of following a rigid schedule, there will suddenly be time for whimsey, time to walk out on the porch with a steaming cup of coffee or wander up the dirt road beside the stream. The stream will be high with runoff, and the rush of water full of promise. I suspect every angler mentally fishes such water, picking out likely spots where a trout might be holding in the icy current. It may be the best fishing of the weekend, and you savor it in a twilight welcomed by the ancient chorus of spring peepers.

Of course, opening day is largely a ritualistic celebration, and trout seldom play a major role. The streams are often crowded, the trout recalcitrant, and the weather raw. I have more often fished in a cold drizzle than in bright sun, and at least two opening days were accompanied by snow flurries. But there was the spring of 1978 after one of the most bitter winters in recent North Carolina memory when the early afternoon temperature climbed to an incredible 88 degrees. In stretches of the stream that had not been disturbed by earlier anglers, wild browns and rainbows leaped at our dry flies and chased nymphs halfway across the gold and emerald pools.

There was also a cool, overcast day that bathed the leafless mountains in silver fog, and every twig and pine needle was tipped with a diamond droplet. That morning, a dark shape appeared behind the dry fly as it floated on the current. The fly began to drag and sank, yet the dark shape still drifted beneath it. No trout would eat such a clumsy offering, but there was an improbable flash of white—a mouth opening—and the fly was gone. Moments later, 19 inches of quivering rainbow trout lay in the net. Released, it swam slowly back into the shadows—a wild fish almost too large to believe in such a small public stream. A ghost, perhaps, or a dream? Surely no one would believe it that evening, and you are not certain you will even risk sharing it. But, of course, you do.

Such moments are so rare on opening day that you have learned to approach this time of renewal with no expectations. Indeed, one year, we decided not to fish. The day dawned in torrents of rain, and the roads were filled with torrents of trucks and cars full of wet, grim-faced fishermen.

"We'll just sit beside the fire today," we said. "Drink coffee, eat a huge breakfast. Tie a few flies and shoot the bull. Let the mobs pound the water and freeze. We'll go tomorrow after they've all got pneumonia."

Late that afternoon, the rain slackened, and we decided to drive up to a local trout pond and watch the circus. You've seen the photos of opening day fishermen standing elbow to elbow, fully encircling a pond that contains a tight knot of throughly spooked trout. Add a cold rain to that scene, and you have a fair representation of what we found when we arrived.

We sat in the car, toasty and comfortable, observing the hordes. They looked miserable. It cheered us immensely. After a few minutes, someone caught a small trout. We fell silent.

"What do you think?" someone asked tentatively.

"We've got our gear," came an answer. "Wouldn't hurt to try it a few minutes."

There was little conversation on the way back to the cabin two hours later. The car heater that had seemed so warm earlier poured out a steady rush of Arctic air. We were wet from head to waist from the rain, and wet from feet to waist from leaky waders. Our gear lay in a sodden mass in the trunk. No one had caught a trout.

"We almost m-m-made it," someone finally said.

March, 1987
Volume 51, Number 3

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Cover *Jack Dermid photographed this tri-colored heron as it perched in a tree overlooking a salt marsh on North Carolina's south coast.*

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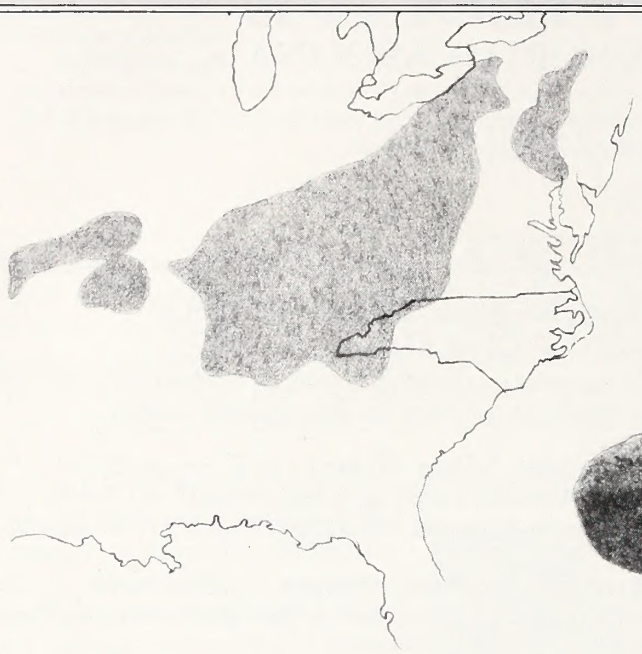
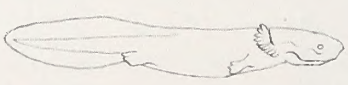


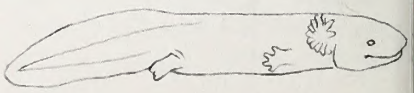
Two subspecies *of hellbenders have been located in the United States. The subspecies found in North Carolina ranges from southern and western New York south to northern Georgia, Alabama, Mississippi and west to Missouri and southeastern Kansas. The Ozark hellbender is found only in southeastern Missouri and northeastern Arkansas.*

Hellbender larvae *keep their gills until about a year and a half or two years after hatching. Juvenile hellbenders develop for two more years until they reach sexual maturity at four years or so.*

at hatching



12-13 days old



30-31 days old

Dragons Of The Streams

written by Lawrence S. Earley / illustrated by David Williams

Up on a mountain stream, an angler feels a tug on his line and begins to reel. He expects a trout, or perhaps a smallmouth bass or robin. Instead, he finds a creature so repulsive-looking that it's all he can do to keep from shouting in horror.

With its brownish, flattened body, its incredibly wrinkled and slimy skin, its small eyes and its sheer size—it grows up to 2½ feet long—the hellbender (*Cryptobranchus alleganiensis*) is no beauty. But that scarcely justifies the fate of many a hellbender so caught. By superstition, some anglers stake the soft-bodied salamander to the stream bank out of the mistaken impression that it competes with fish for food, or merely as punishment for being so ugly. Indeed, because of its grotesque appearance, the hellbender is among that luckless class of animals unloved and unsentimentalized by humans, a group that includes snakes, wolves, rodents and most insects.

And yet, although looking like a reptilian leftover from the Triassic Age, the hellbender is harmless, unless you thrust your hand down its throat and let it scrape you with its tiny teeth. Nocturnal, like most salamanders, the hellbender rarely, if ever, emerges from water—a hellbender out of water is a hellbender in trouble. And like other salamanders, it is cold-blooded, has a moist skin and lays jelly-coated eggs.

The hellbender is a mountain species in North Carolina. It inhabits the larger streams of the Mississippi River drainage, according to Alvin Braswell of the N.C. Museum of Natural Sciences. Typically it hides beneath large, flattened stones on the river bottom, ambushing crayfish, minnows or whatever it can find. The large size of an adult makes it pretty much predator-free, although smaller, larval hellbenders are eaten by fish and also by adult hellbenders.

The adult's breeding behavior is similar in some respects to that of other salamander species but differs in important ways. It begins its breeding activities in late summer. The male constructs a nest beneath a sheltering rock and then entices, sometimes forces, a female onto the nest until she lays her eggs. The males of some salamander species produce sperm first which the female takes into her body to fertilize her eggs. But hellbenders spawn like fish, the female laying her eggs and the male fertilizing them by spewing forth his milt. The male guards the eggs until they hatch, a three-month watch. During the next four years, the young hellbenders pass through larval and juvenile stages until they reach sexual maturity.

Juvenile and adult hellbenders possess poorly developed lungs and have no gills. How then do they breathe in water? Oxygen diffuses from the water through the skin and directly into the blood stream. The grotesque folds of skin that droop from their bodies serve an important purpose, exposing to the water more skin surface with its elaborate network of capillary blood veins. Hellbenders also rock back and forth to keep freshly oxygenated water coursing over their skin.

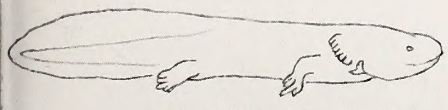
Hellbenders are a long-lived species—in captivity, they have lasted 55 years. In the wild, however, they often fall prey to man's fears or his pollution—they are extremely sensitive to changes in water quality. Unlovely and unloved, the hellbender yet plays an important role in the cold-water streams of our mountains.

***Like a prehistoric** leftover, the hellbender is one of the largest salamanders in the western hemisphere. It lives in clear, cold mountain streams, rarely coming into view and foraging on stream bottoms for crayfish, fish and other foods. With no gills and only rudimentary lungs, the adult hellbender can survive for weeks in water by taking in oxygen through the drooping folds of its wrinkled skin.*

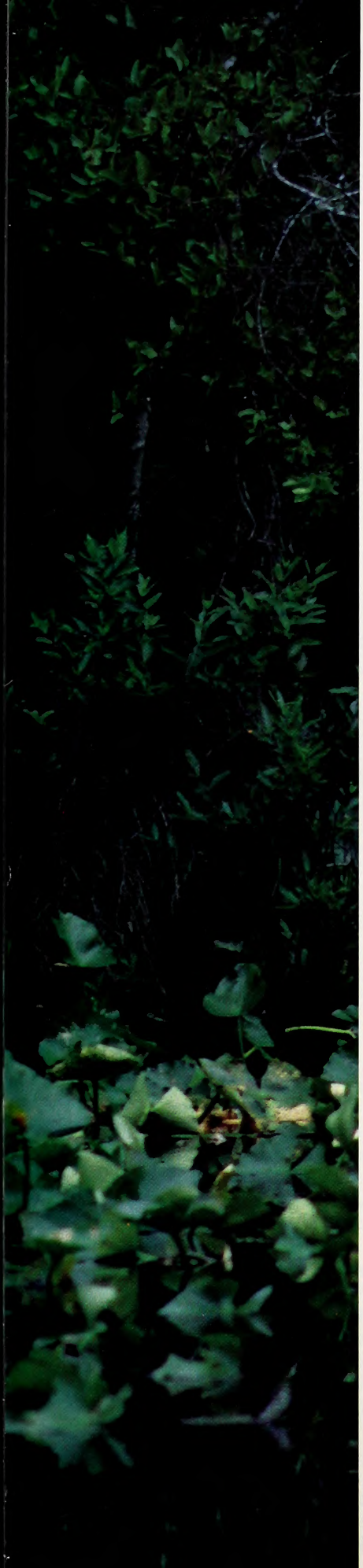
Hellbender foods

Item	*Frequency encountered*
Crayfish	59.0%
Insects, worms and tadpoles	21.0%
Fish	35.0%
Extraneous material (leaves, mud, pebbles, and sticks)	53.0%
Empty	3.0%

(from analysis of 34 hellbender stomachs in West Virginia)



55-57 days old



EUGENE HESTER

Johnny Scoggins, Johnny Willikens And The Barrel-Maker

Odd names are not the only fascinating things about the herons, egrets and bitterns that live in our marshes, ponds and wetlands.

by Kay Scott

Most birds are seen only on the wing, flitting from tree to tree like songbirds, soaring high in the air like hawks or coming low into a slough like ducks. But there's another group of birds that we notice more often when they're standing almost perfectly still.

These are the long-legged wading birds, the herons, egrets and bitterns that stalk the fringes of wetland areas throughout the state. Standing alone in a salt marsh, a heron or egret could be mistaken for a piece of driftwood or even sculpture. Of course the bird will eventually move, stepping gracefully and stealthily through the shallows after a minnow, or launching itself into the air with deep and slow wing movements. Little wonder that herons have inspired the human imagination so deeply. Early oriental artists made them the subjects of their brush paintings. Fashion designers used egret feathers in their millinery confections. And story tellers have even woven herons into their fables.

A hummingbird came to the heron with a challenge—a race from the ocean in the east to the ocean in the west. Naturally the heron, being much slower of flight, was reluctant to accept. However, he later found himself teased into the challenge. Immediately, he began to regret his decision. The hummingbird was out of sight before he could even lift his wings.

The race took four days. As it progressed, the heron, slow and steady, would overtake the hummingbird only in the evenings. (The faster hummingbird being required to stop and rest after his frantic daily flights.)

The heron overtook the hummer earlier and earlier each succeeding evening. Until the final evening when the heron passed the exhausted small bird just after sunset. By mid-morning the next day the heron had reached the ocean and easily won the challenge. Once again proving the theory that "slow and steady win the race."

—a Southeast United States fable

Herons, egrets and bitterns are members of the family Ardeidae, belonging to the order Ciconiiformes which includes storks, ibises, spoonbills and flamingos. Although individual members of this family are called herons, the term heron also includes egrets. Herons are characterized by the 15 to 17 vertebrae in their long necks, their bones arranged so that their necks assume an S-shaped curve. They extend their necks when taking flight and when landing, but while in flight they fold their necks and bring the head close to the body. In contrast, cranes, storks and ibises fly with their necks extended.

There are 12 species of long-legged wading birds in North Carolina. All of them may be said to be native to North America, although the most recent arrival is the cattle egret which came from Africa by way of Venezuela. Most heron species are found wherever there is water, but the greatest variety and numbers inhabit the coast. Herons and egrets are such common residents of the coastal areas that duck hunters occasionally use a lone bird as a

The great blue heron *(Ardea herodias) is most easily seen in coastal salt marshes, although it nests in swamp and river bottoms. It hunts by stalking its fish prey or by waiting motionless for prey to swim near. The great blue is about 4 feet tall and has a wing spread of up to 7 feet.*

JACK DERMID

KEN TAYLOR

Johnny Scoggins, Johnny Willikens And The Barrel-Maker

"confidence decoy." Decoy egrets or great blue herons placed near a set of duck decoys help make the group look more natural and undisturbed to a flying waterfowl.

Perhaps the showiest of the heron family are the egrets, named after the long white plume called the "aigrette" that grows during breeding season and is shed just after. (All egrets except cattle egrets develop the graceful plume.) During the late 1800s, fashionable ladies wore a bird, an aigrette or a bird plume on their hats, and huge numbers of great egrets and snowy egrets were slaughtered to satisfy the fashion. The recurved plumes of the snowy egret were in such demand by the millinery trade that plume hunters were offered $32 an ounce for them.

North Carolina's egret population, like populations nationwide, plummeted. According to Dr. James F. Parnell of the Biology Department of the University of North Carolina at Wilmington and co-author of *Birds of the Carolinas*, there are no definitive population counts of birds from that time.

"However, we do know that during the late 1800s, there was a period when these birds were killed in North Carolina," says Parnell. "We also know that during the period some species became very rare in this state."

The breeding plumes, *or aigrettes, of snowy egrets were popular items in women's millinery fashions at the turn of the century. This diminutive egret was almost extirpated by plume hunters to satisfy the demand, but its numbers have rebounded.*

The snowy egret (Egretta thula), *left, is smaller than the great egret and runs after its prey. Sometimes it may even take to the air and descend on fish or other aquatic creatures.*

The great egret (Casmerodius albus) *may sometimes be confused with the snowy egret. Both are white, but the great egret is larger and has a yellow bill, black legs and black feet. The snowy egret has a black bill, black legs and yellow feet.*

Because of this trade, several species of egrets were approaching extinction before protective laws were passed in the 1900s. By 1917 populations had begun to recover because of strict protection of the rookeries (communal nesting grounds), education and legislative campaigns to save them.

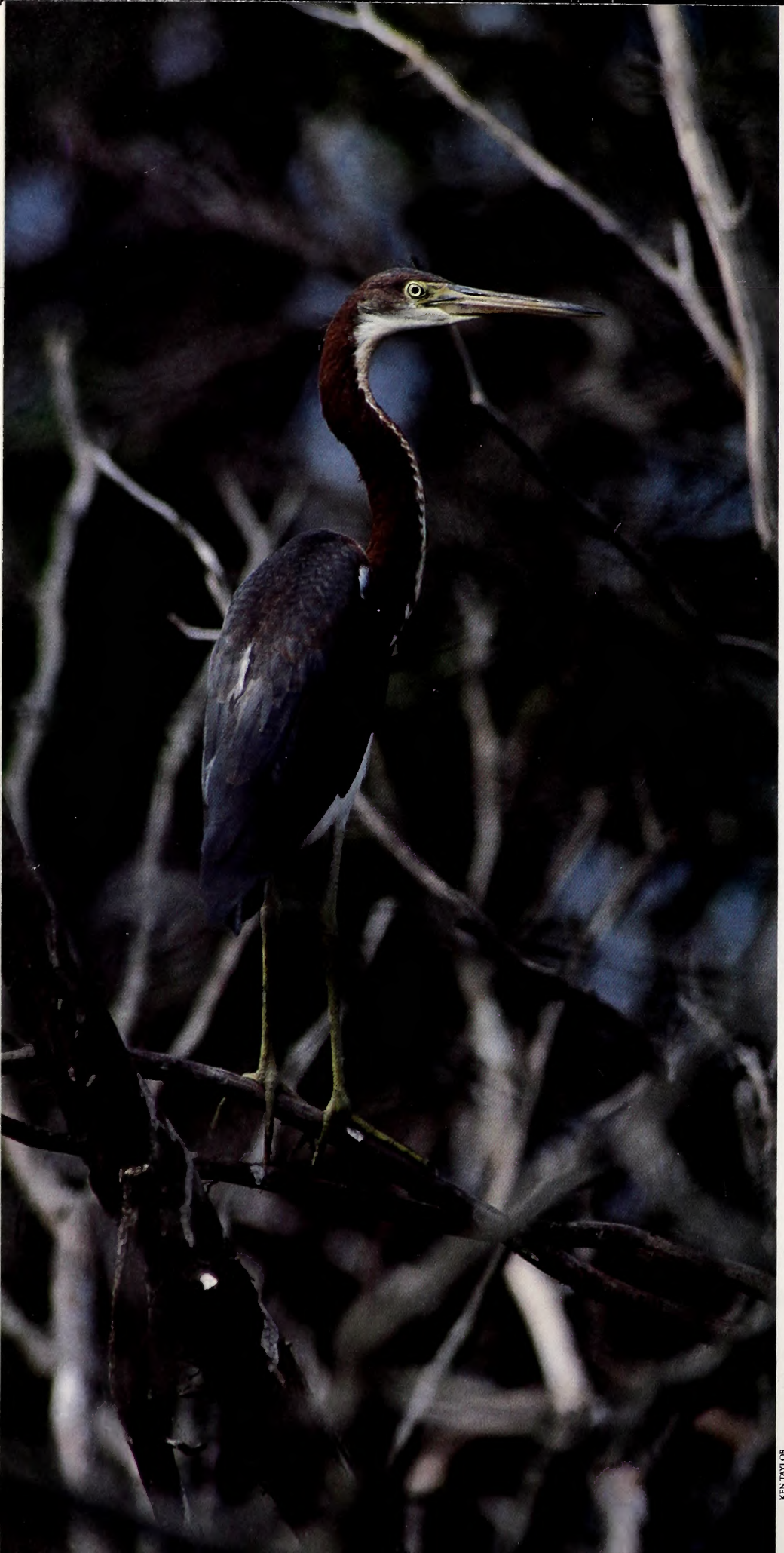
"Today, as far as we know, the numbers (of these birds) are probably the highest that they have been in North Carolina," says Parnell. "As best we can tell, these birds are reaching or have recovered to some degree from these early slaughters. We do know that since the early 1900s, when ornithologists began looking and counting, there seems, for most species, to be a steady increase in populations."

These birds have always attracted a certain mystique. Consider, for example, the variety of common names for different herons. "There are a lot of neat names for them," says Parnell. "'Old quark' is one." This name comes from the noise the night heron makes en route to its feeding territory. A generation ago, North Carolina residents had a couple of other unusual names for the birds. "My father-in-law, who was a Hyde county native and an avid birdwatcher, always talked about the herons," states Parnell. "He called the great blue heron 'Johnny Scoggins' and he called the great egrets 'Johnny Willikens.' My impression was that these were names in common use in the northeastern parts of the state. The term 'scoggins' still seems to be in use as meaning a heron."

Herons are usually communal creatures. They breed and nest in rookeries with others of their own kind. While in the rookery or on their way to and from their feeding grounds, herons make noises that sound like throaty croaks, squawks and occasional hisses. The rest of the time they are fairly silent. Green herons and night herons call more often than other species. They make a sharp "kuke" when disturbed.

For some species, breeding season begins as early as March. For others, it is as late as

KEN TAYLOR



KEN TAYLOR

***Formerly called** the Louisiana heron, the tri-colored heron* (Hydranassa tricolor) *stalks the shallows for its food, or dashes quickly after aquatic prey. This slate-colored heron is the most abundant heron in the Southeast.*

Johnny Scoggins, Johnny Willikens And The Barrel-Maker

May. Heron nests are stick platforms in trees, bushes or in clumps of wetland vegetation. Usually, these birds will group their nests together. Some birdwatchers say that their nests are flimsy when they are first built, improving throughout the year and in succeeding years because the birds often use the remnants of old nests as a base for new construction.

Herons pairs are usually monogamous, at least during the breeding season. Both adults share in the construction of the nest, incubation of the eggs and feeding of the young. The male first selects the territory. The female then shapes the nest while the male gathers materials for her to use. Depending on the species, females will generally lay between three and five eggs.

After the eggs are hatched, both parents feed the young. According to Dr. Parnell, herons use a combination of methods to hunt. "In some cases," he says, "they stab their prey. But in most cases, they grab at something with open bill and catch it between the mandibles." (Mandibles are the lower bill paired with the upper bill.)

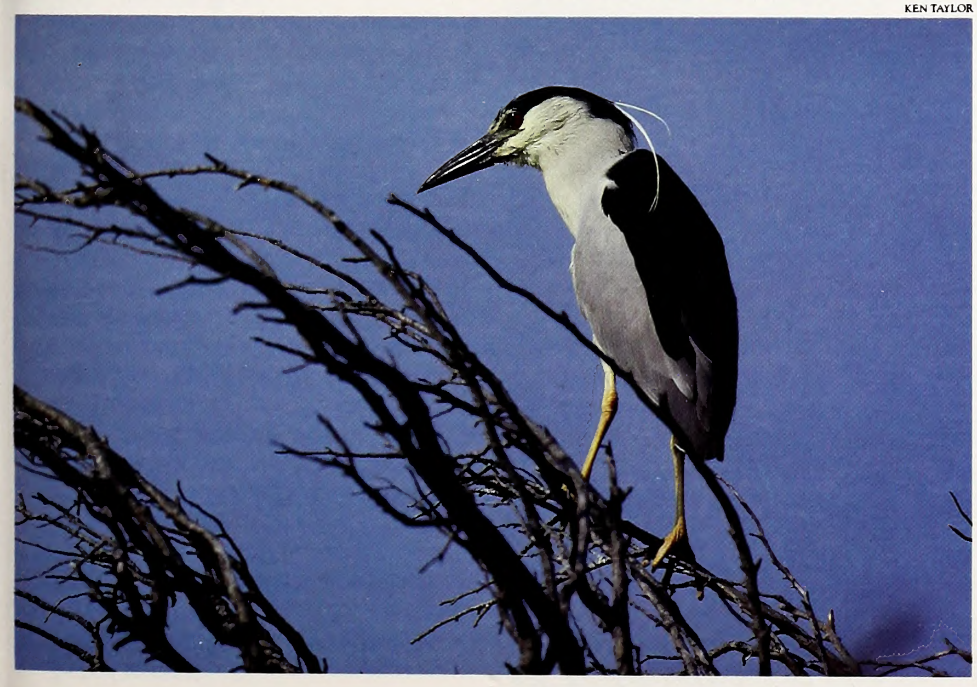
"I think that it depends partly on the size of the prey," says Parnell. "If they are feeding upon a relatively small fish, catching minnows for example, they are not as apt to stab. But, if they are catching bluegills of some size," he continues, "they might actually stab one. I have seen some photographs which did show a heron with a fish impaled on its bill."

When parents return to the nest after feeding, the chicks stimulate the adults to regurgitate food. They do this by grasping the parent's bill and wrenching it downward. Access to the parents bill means food and continued life for the chicks. Weak chicks who do not gain access to the food starve.

Herons, egrets and bitterns typically lay more eggs than can survive. After incubation, the eggs hatch at one- to three-day intervals. Thus, early hatchlings have a head start in development. Older birds will typically attack younger chicks and drive them from the nest. This is particularly true among egrets. This means certain death

JACK DERMID

KEN TAYLOR



The cattle egret (Bubulcus ibis), *though originally from Africa, has spread through the Southeast, breeding in nests sometimes vacated by other herons. These egrets eat ticks off cattle and look for insects and mice stirred up by grazers.*

The black-crowned *night heron* (Nycticorax nycticorax), *as its name implies, is a nocturnal creature, hunting for fish, crayfish, snakes and amphibians.*

either from the fall, from predators or from starvation since parents seem to ignore chicks outside the nest.

Naturalists also warn of the unpleasant consequences of humans disturbing these birds. "When you approach the nest, one of the things that youngsters often do is to

EUGENE HESTER

KEN TAYLOR

Johnny Scoggins, Johnny Willikens And The Barrel-Maker

regurgitate whatever they ate last," says Dr. Parnell. "If their nest happens to be over you, they may regurgitate on top of you.

"It probably is a behavior that, to some degree, acts as a defense mechanism, although it may or may not be designed that way," he says. "It may just be something that happens when they are disturbed or frightened. Either way, the end result is that sometimes you can get some pretty smelly stuff dumped on you if you walk under their nest."

Naturalists also warn against picking up an injured bird. Herons often strike with their sharp beak. When they do this, they usually aim for the eyes.

Both herons and bitterns have a specialized set of feathers that grow from spots on their breast, rump and flanks. These are called powder downs. According to Parnell, "Powder downs are special kinds of down feathers which are very brittle. In addition, these feathers, unlike others, continue to grow. The bird breaks off the tip of these feathers and it forms a powdery substance."

Herons use this powder to dress their plumage. It soaks up oil and slime and is then combed from their feathers by scratching with a serrated nail on the middle toe. Following this, their feathers are waterproofed with oil from the preen gland.

Bitterns are smaller, more secretive marsh

The little blue heron (Florida caerulea) *resides along the coast but may also fly inland, especially in July through September, after breeding is over. The maroon head and neck is a key mark of identification.*

The least bittern (Ixobrychus exilis) *freezes with its bill pointed skyward when startled. The striped chest of the small bird blends with the marsh grass where it secrets itself, and it will even bend with the wind to maintain its camouflage.*

The green heron (Butorides striatus) *nests away from water, in dry woods or even apple orchards. It hunts in an almost horizontal position, far different from the near vertical position of most herons.*

birds than their heron and egret cousins. When compared to herons, bitterns have shorter legs and shorter, heavier bodies. Bitterns live in a concealment of cattail and sedge rushes while herons keep to open edges of streams and swamps. Most often, they are heard rather than seen.

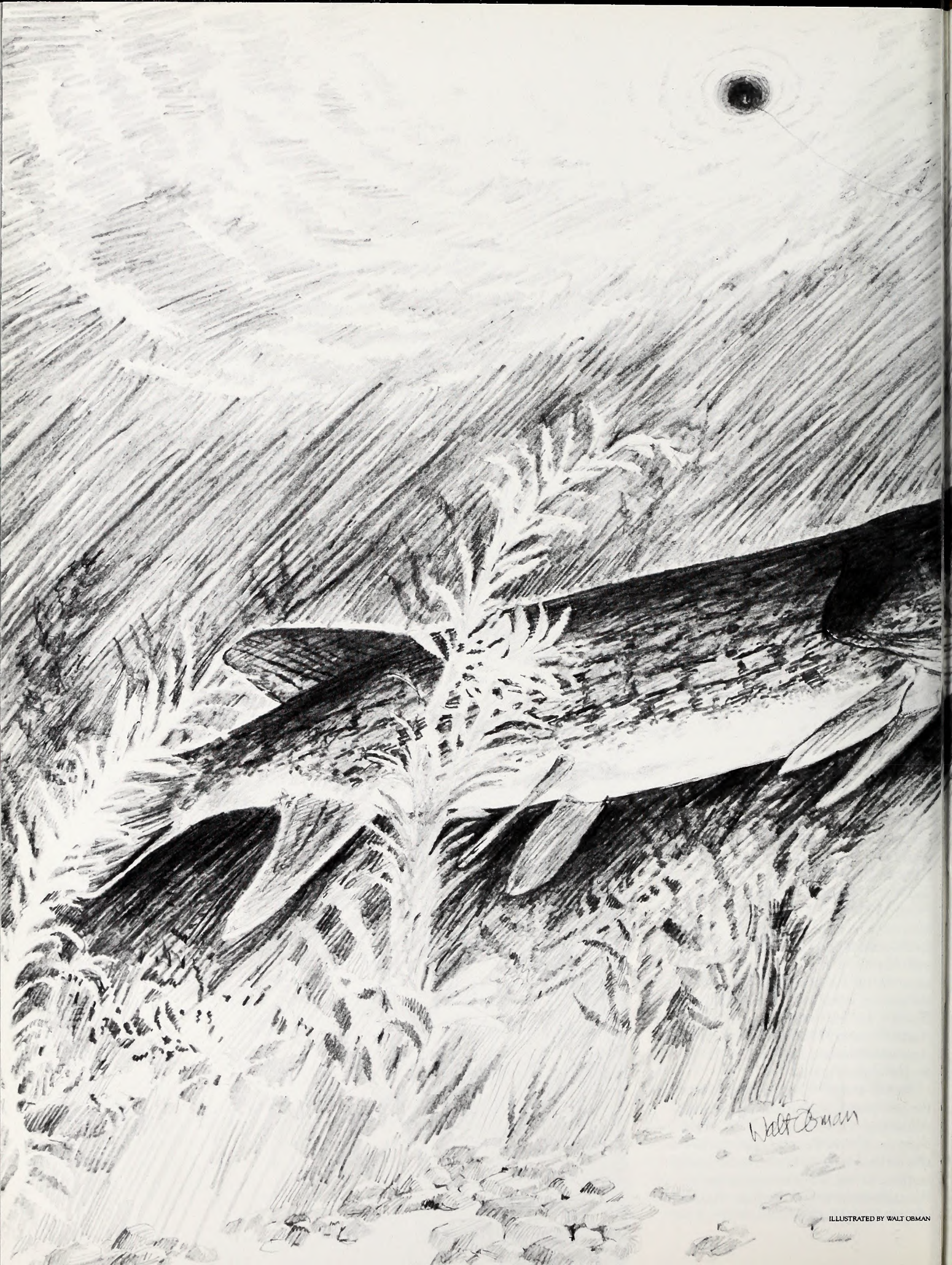
The most characteristic behavior of a bittern is its preference to hide by "freezing." When startled, the bird lifts its head, contracts its body so it resembles a reed and stands frozen. In addition, the bird will even sway like reeds in the wind in order to convince the attacker to go away.

The bittern's name comes from a Greek term relating to the remarkable sound of the Eurasian bittern which resembles the lowing of an ox. The characteristic sound of the American bird is less bovine and has given rise to such nicknames as dunk-a-doo, stake driver, barrel-maker and thunder pump. Because of its characteristic stance when alarmed, the bird is also known as stake bird, sky-gazer, and sun-gazer.

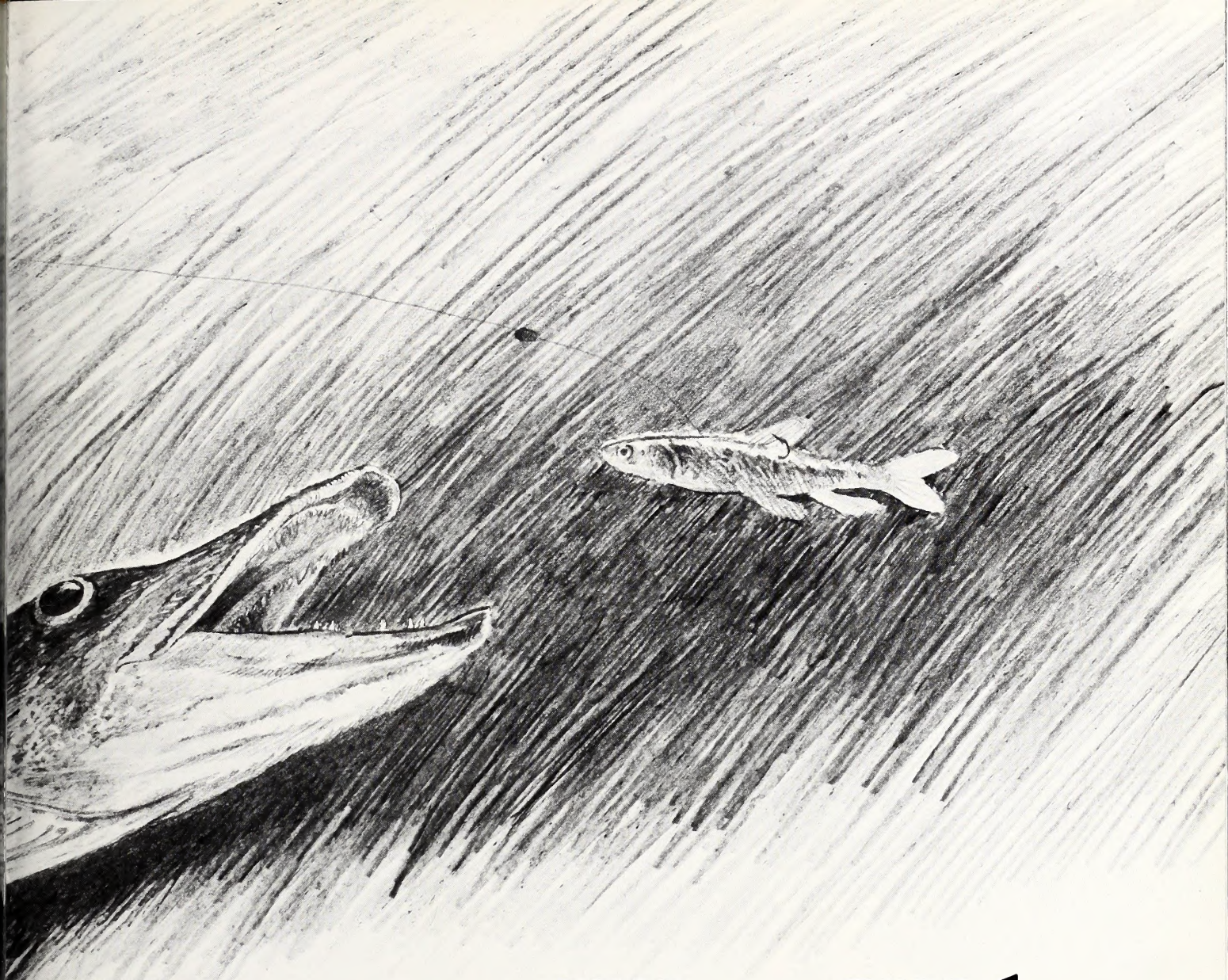
Specific information about the bitterns, herons and egrets in North Carolina is available in *Birds of the Carolinas* by Eloise F. Potter, James F. Parnell, and Robert P. Teulings (University of North Carolina Press, 1980). This excellent book contains information on the range, nesting habits, feeding habits and a general description of each bird. In addition, color photographs assist the bird watcher in identification of the species. Additional information may be found in any bird book or guide book. The *Audubon Society Field Guide to North American Birds* and the Peterson guides are particularly good.

Parnell writes, "The coastal estuaries are the best places in the state to see herons. Almost anywhere along the coast where there are salt marshes and tidal creeks one should be able to see herons in the spring, summer or fall. Some herons do stay on throughout the winter but their numbers are greatly reduced." ⊠

EUGENE HESTER



ILLUSTRATED BY WALT OBMAN



Waccamaw Water Wolves

Scatter a few bread crumbs, catch some "roaches," and find out why some fishermen believe the chain pickerel is one of our best gamefish.

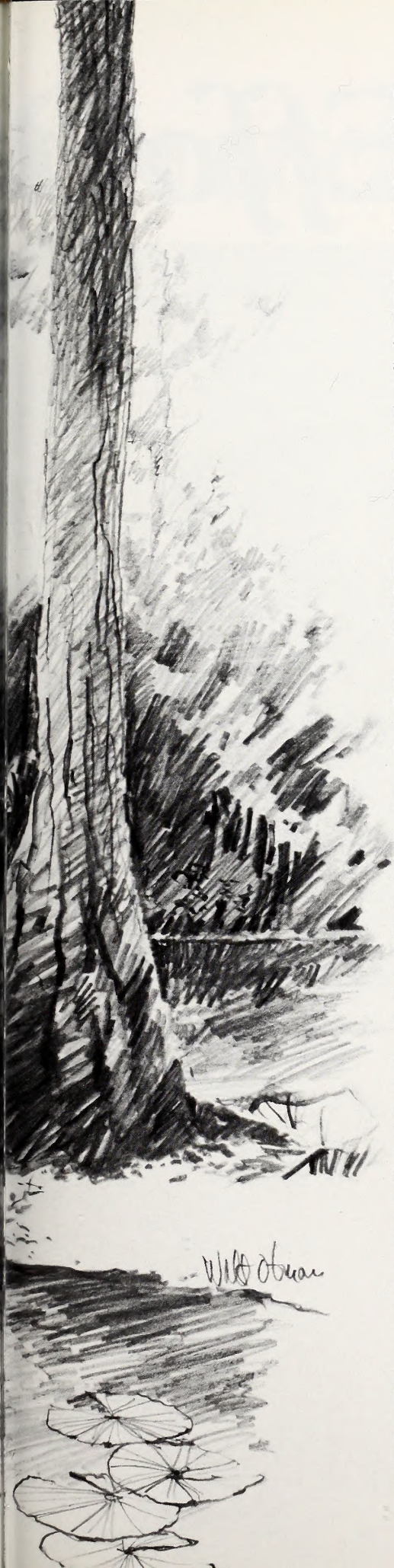
by W. Horace Carter

Willow bushes line the shoreline of the Waccamaw River, and ancient cypress trees and Spanish moss grace the swamplands on both banks. The river traces the border between Columbus and Brunswick counties in southeastern North Carolina. The place looks fishy and it is. Generations of Carolinians have fed families with the fish harvested from these bountiful waters.

One local angler, the late A.J. Allen, usually fished alone in these waters, but he reluctantly agreed to let me share his 10-foot, homemade cypress batteau one afternoon. He tied the bow of the boat to one of the droopy willow branches on the leeside and grunted a command for me to secure the stern. Minutes later he was molding a tiny ball of bread on a hair hook that was tied to black sewing thread. The thread was in turn fastened to the end of a skinny 4-foot piece of native reed.

A.J. sprinkled a handful of bread crumbs on the surface. It didn't take long. Six inch shiners, called "roaches" in the Tar Heel state, began flipping on the water, and A.J. quickly brought one of the forage fish over the gunnel and slipped it into a rusty old minnow bucket. He repeated the bait-catching technique half a dozen times in the next few minutes, then instructed me to "put one of them roaches on a hook and toss him right behind the boat next to the willows."

He had four strong cane poles that stuck out in front of the boat 4 or 5 feet.



Obviously, he wanted to fish a short distance from the boat and I figured that was to get away from the shiners he was catching just in dipping distance of where we sat. I picked up a big shiner, impaled it under the dorsal fin and dropped the bait near the willows behind us.

A.J. had a cork as big as a golf ball tied about 4-feet above the live bait and a piece of wrap-around lead squeezed tight on the line 6-inches above the huge bass hook. I dropped my rig into the lake water with a splash, and I imagined it spooked everything within an acre of water. Only seconds passed before the cork slid a few inches on the surface, then disappeared. Ten feet of line played out so fast it sang as it parted the water. I figured that shiner was being carried by the devil himself.

"Set the hook! Set the hook!" A.J. yelled, and I yanked on the bamboo with plenty of gusto. I knew right away I was in for a struggle. The big predator that had gulped my shiner wasn't in any mood to come aboard.

The strong monofilament line, big hook and stubby pole soon prevailed, however, and I landed a 4-pound chain pickerel. It was unsophisticated fishing gear but efficient.

That was my first experience catching a chain pickerel, known all over the South as a "jack" or "jackfish." We caught a dozen that spring afternoon that were 20 to 30 inches long, all on old-fashioned cane poles and live bait. Oddly, we were catching the bait within a couple of yards of where we were hanging the pickerel. It was apparently easier for these long-nosed critters to catch the tasty morsels we had tied out for them than it was to stalk one that was loose in the same neighborhood.

Over the years, fishermen throughout much of the South have enjoyed angling for these jacks—slender gamefish with evil eyes and hacksaw teeth. Not blessed with fins that would give him the lateral movement of a bass, the chain pickerel has a physique that gives him straight ahead propulsion equal to any fish his size. The long, slender body may reach 30 inches, or more, yet he seldom tips the scales at the 5 or 6 pounds the fisherman guesses when the wriggling critter is flouncing on the deck. Still, despite his reputation, this fish is every inch a fighter.

Not many anglers deliberately seek pickerel on a fishing trip. Most pickerel are caught by fisherman who are actually hunting more renowned species. For a happy handful of anglers, however, these feisty jacks have established a reputation for spirit, and some anglers will attest to the tastiness of the meat when steaked and fried crisp and brown in a skillet. The result is a small, but intensely loyal fraternity of fishermen who delight in pickerel.

I don't think it makes much difference what bait you use—live or artificial—when you're jack fishing in the swampy waters of North Carolina and most other Southern states. Pickerel are not choosy about bait, time of day, weather or phase of the moon; however, I do believe they bite better in cold, rainy weather than they do in warmer, sunny weather. They seem to strike almost anything year-round as long as it appears to swim and is no larger than the jack itself.

An indiscriminate predator, a chain pickerel may snatch a red-winged blackbird off a bulrush, swallow a swimming squirrel, grow fat on shad, crayfish, baby alligators, insects, frogs, bream and crappie or any reasonable artificial facsimile. Pickerel simply do not inspect what they strike all that closely.

There is joy in a jackfish strike even when you could buy any other kind of fish. It's vicious—no other word for it. Furthermore, this fish will often perform all kinds of acrobatics in an effort to unbutton the hook, especially when it's close to the boat or net. And you better use a landing net because its sharp teeth can cut strong monofilament as the fish shakes its head from side to side if lifted above the surface when landing. You can keep that in mind when retrieving your hook from the jack's mouth, too.

Many fishermen use heavy line for pickerel because of these teeth but pickerel will hit better if you use a light line in a 8- to 10-pound test class. They may cut it sometimes, but that's better than having no strikes.

Few chain pickerel anywhere reach weights of 6 pounds—the world record is only 9 pounds, 6 ounces for a jack by Baxley McQuaig of Homerville, Georgia. It is not unusual to land a 30-inch jack in most bodies of water where they abound, but the average jack is more likely to be about 20 inches and weigh between 2 and 3 pounds.

I fish the Waccamaw River shallows where there is good cover. Trees, logs, lilies and grass patches are fine havens for jacks, waiting to ambush a forage fish. I use a small, shiny lure tied directly to my line—no wire leader or swivels—or else use the natural forage live baits. While some of the jacks have a personality that defies explanation and would gladly gulp the bait, swivel, leader and all, most individuals are more cautious and shy away from this hardware. I keep in mind that the jack, unlike the largemouth bass that often roams in search of food, stays in hiding and waits for the food to come to him.

That's okay with me. I'll take it to him anytime. ⊠

Extra Effort

Outdoorsmen

It takes more than the loss of limbs to keep many hunters and fishermen from pursuing their favorite sports.

written and photographed
by Terry Shankle

On a cool fall morning, four sportsmen in four separate parts of North Carolina prepare for a day in the outdoors. They may have success bagging game or fish, or they may come home emptyhanded. They're likely to get cold; a couple may get wet. They'll all have a great time. Although these sportsmen have never met, they share a common bond. Each is handicapped.

These four sportsmen don't mind the extra trouble it takes to pursue their sport, nor do they dwell on it. But they'll tell you the rewards, physical and mental, from their outdoor experiences are well worth the trouble.

Benny Phillips is familiar to many people because he's the sports editor of the High Point Enterprise where he covers NASCAR (stock car) racing and hunting and fishing.

Benny has traveled widely in the past 22 years, especially to cover racing, but it's put a strain on his outdoor writing time and hunting and fishing time. Still, the 50-year-old native of Boonville in Yadkin County has learned to find time to get outdoors, and he doesn't let a pair of leg braces and two crutches hold him back. Crippled by polio in 1952 when he was 16, Benny quickly learned that continuing his hunting and fishing would require some effort.

"I didn't get a lot of encouragement to continue hunting and fishing after my bout with polio," said Phillips. "But I never looked at it as a challenge. They were

***Bennie Phillips** is known to many Tar Heel sportsmen as the sports and outdoor editor of the High Point Enterprise. A childhood bout with polio hasn't prevented him from enjoying hunting and fishing.*

Extra Effort Outdoorsmen

activities I'd enjoyed to that point in my life and I simply wanted to continue enjoying them. Fishing from a boat, the bank or a pier isn't that difficult for a guy on crutches, but getting to the place or into a boat can present some problems.

"Hunting is different because of the amount of ground that often must be covered. I love to quail and deer hunt and have tried just about every way in the world to get around. I've used a parachute harness and block and tackle to deer hunt from tree stands. I've quail hunted from jeeps modified with platforms. I've quail and rabbit hunted from riding lawnmowers with the mowing deck removed. You name it and I've tried it.

"NASCAR Hall of Famer Jim Paschal and I used to get all kinds of strange looks on a rabbit hunt," said Phillips. "When we pulled up to a farm to hunt, the first thing off the truck was the riding mower and then the dogs. I nearly wore out Paschal's mower hunting from it, and the comments we got were something else."

The greatest aid to Benny's hunting came in 1970 when a friend returned from an outdoor show with news of a new type of ground vehicle. "He told me about a three-wheeled vehicle made by Honda that he thought would be just the thing for my hunting," said Benny. "I've worn out seven or eight three-wheelers and think they're a real salvation for any handicapped person who loves to hunt and fish. I tow it on a small trailer behind my pickup. After unloading it, I drive it to my hunting spot, crawl off, cover the machine with a camouflage cloth and sit beside it. I've killed several deer using the machine as a rest."

For the loved ones of handicapped people who might try to discourage outdoor activities for safety reasons, Benny has some advice. "Safety should be considered, but it shouldn't be allowed to stop a person from trying. I feel much safer hunting and fishing than I do moving around the garage area at a NASCAR race doing my job. I've been bumped by race cars, but I've also turned over many a three-wheeler on a hunting trip. I don't think about it any more. I just get up and keep on going."

***David Autry** of Hampstead lost a leg to diabetes when he was 77, but he enjoys fishing for bass and bream in golf-course ponds that are easy to reach.*

David W. Autry is better known as "Bow Tie Man" to the people around Hampstead about 15 miles north of Wilmington. The nickname comes from the ever-present bowtie he sports on his collar. A retired federal government fireman at the Sunny Point Army Terminal, Autry has lived in the same house in Hampstead since 1933 and has hunted and fished throughout the Coastal Plain for nearly all of his 79 years.

In 1984, he lost his left leg to diabetes, but as soon as he had recovered from surgery he set about finding ways to continue hunting and fishing.

"I'm retired with nothing but free time, so I made up my mind not to sit around the house but to keep doing the things I'd always done," he said. "The hunting isn't much trouble because down here we hunt deer

***Eldridge "Tinker" Kornegay** lost his legs in an accident as a baby. He began fishing two years ago with his brother, mostly for bream and crappie in small lakes and ponds.*

with dogs, so I do most of my hunting close to my pickup. Fishing is more of a problem. I mainly fish ponds from a small boat using an electric trolling motor. That was easy when I had two good legs, but after my operation unloading and loading the boat became harder. I attached a winch in the bed of the pickup to make it easier to handle the boat, and I use a walker to get around instead of crutches because it makes me more stable and that helps me handle the boat.

"Many of the ponds I fish are on golf courses," he said. "I fish some from the bank, but have permission to drive to most of them and slide my boat in. I've had some close calls with the golf balls whizzing by, but these lakes have some nice bass and shell-crackers in them. I guess the worse trouble I've had was while I was anchored in one of the golf course lakes and had a mild heart attack. One of the girls who works there noticed I was in trouble and swam out to the boat, raised the anchor, and drove the boat to shore. I recovered from that pretty quick, but now they check on me regularly when I'm fishing. I think that's real nice of them.

"I've killed at least 150 deer in my day, all of them in front of deer hounds," said Autry. "I've been a member of the Hampstead Hunting Club since 1950, and most of the club meetings are held in the building in my backyard. We cook at most of the meetings and have a big time. Hunting and fishing have always been a big part of my life, and I'm not going to let the loss of this leg stop me from doing the things I enjoy most."

Eldridge B. Kornegay Jr. lives in Kinston and has been handicapped as long as he can remember. "Tinker," as he's known around Kinston, was injured in a farming accident 32 years ago when only a year old.

"My mother was helping barn tobacco and had put me on a blanket to play," he said. "One of the trucks backing up to the barn accidentally backed over me, crushing my thighs just below the hips. I was in casts several times during the next year or so, and my legs never healed so they were removed at the hips.

"As I was growing up, my parents tried everything to help me get around. I got around okay with artificial legs and crutches, but when I fell it was practically impossible to get up again. I tried a wheel chair, but that was before most buildings and curbs were made more accessible to the handicapped. I finally decided to put all that stuff away, and built myself a heavy cart fitted with industrial casters for wheels. Now, I get around just fine.

"I was never much of a sportsman when I was growing up, but about two years ago, my brother bought a boat and started taking me fishing in ponds and lakes. We get out there on the water and forget about our troubles, and just have a good time. We generally fish for bream and crappies and most times come home with a cooler full. We also fish for flier perch in some of the local mill ponds, and I fish for shad in the Neuse River when they're running, as well as catfish. I'd rather fish in ponds though."

"I have a lot of respect for the water and always wear my life preserver," said Kornegay. "I've never fallen in, but my brother did one day and his only thought until he popped up was whether he had thrown me out. I stayed in the boat and had a good laugh when he came up.

"Fishing has had a big impact on my life," he added. "It gives me enjoyment, but the challenge of it gives me something to strive for. I believe it's an excellent activity for handicapped people."

Leonard Taylor of Pine Hall in Stokes County has been handicapped since 1979. Following a car accident, his left leg was removed above the knee. Since he had grown up in a rural environment where hunting and fishing was commonplace, he was determined not to let the lost leg stop him. The 29-year-old Taylor still hunts and fishes regularly in addition to working part time as a taxidermist.

"My family was concerned when I

Extra Effort Outdoorsmen

decided to begin hunting again." he said. "They were afraid for me to climb trees and walk on rough ground, but they soon saw that I was much happier when I returned to my normal way of life.

"I get around well on my artificial leg, but my job as a mason is very hard on it, and I'm constantly having it repaired.

"It hasn't really bothered my fishing, but I've had to make a few adjustments to continue hunting," he said. "I like to hunt deer, squirrels, and doves, and I also duck hunt by floating the Dan River in a small boat. When I took up archery hunting for deer, I really had to make some adjustments. You have to get so close to the deer for a good shot, and that involves being very quiet. I found that as I tried to move around on my stand for a shot, my artificial leg would squeak and scare the deer. I had to modify the leg with padding and make sure it's well oiled before I hunt.

"One of the funniest things that's happened to me involved a deer hunt with a friend," he said. "We split up to go to our stands, and as I turned to enter the woods from an old road, I heard something pop. When I took the next step with my left leg I stumbled and fell. The foot part of the artificial leg had come loose and was lying in the road with my boot and scent pad still on it. I didn't want that to ruin my hunt, so I hobbled a few more steps to my stand and managed to climb the tree. At dark my friend came down the road on the way out and found my foot. It scared him until I asked him to come over and help me down.

"I've had five artificial legs so far because I'm so rough on them, but Bill Teague, of Central Prosthetic and Orthotic Laboratory in Greensboro has been great about repairing them and keeping me going." Bill Teague is a certified prosthetian, meaning he is certified by the American Board of Prosthetics to build and fit artificial limbs. Helping people like Leonard Taylor achieve more than just the basic activities of living has become his second career.

"Leonard is not alone in the demands that he places on his artificial limb," Teague said. "I work with the National Handicapped Sports and Recreation Association, which sanctions competitive winter sports, and sports and athletics are a proving ground for prosthetic and orthotic devices. In the last five years, there have been more improvements than in the past 25 years. There is also the U.S Amputee Athletic Association which sanctions such sports as swimming and track and field.

"World War II with its large number of amputees brought about the basic prosthetic techniques," he said. "Then came Vietnam with its younger, more active amputees who demanded more from their artificial limbs. We're now building devices from stronger, lighter materials that give our patients more mobility.

***A three-wheeler** furnishes Bennie Phillips with mobility in the field. He often covers the vehicle with camouflage cloth, and uses it as a blind when deer hunting.*

***Leonard Taylor** of Pine Hall lost a leg in an automobile accident, but hasn't let it interfere with his hunting or his work as a brick mason. He particularly enjoys deer, squirrel, dove and duck hunting.*

***Bill Taylor** of Greensboro builds and fits artificial limbs, and has seen tremendous improvements in these devices. Hunting and fishing are excellent activities for the handicapped.*

"Hunting and fishing can be a great form of rehabilitation for the handicapped," Teague added. "The biggest problem is usually with the family of the handicapped person. Families, as well as friends, have a tendency to become overprotective. They fear that trying new things will cause injury to the patient. Often psychology must be used to convince the family to let their loved ones try new things like outdoor activities."

North Carolina has thousands of handicapped sportsmen who hunt and fish. Even people without hands, or with only one arm can find ways to enjoy such sports as fishing with the use of electric reels. Getting outdoors again with a rod and reel or a gun is one of the best ways to renew your zest for life. Just ask Benny, David, Tinker, Leonard or Bill. ⊠

The Shorebird No One Sees

Wonderfully camouflaged, piping plovers are also extremely rare along our coast, numbering perhaps fewer than 60 birds.

by William Walker Golder and James F. Parnell

There are ghosts on our beaches. A summer walk on the beach at Hatteras, Ocracoke, or Core Banks may lead to the discovery of a small, beach-dwelling bird so well camouflaged that it is usually not seen until its sudden movement betrays its presence. Even after discovery it may seem to disappear if you look away briefly. Indeed, very few of the thousands of visitors to the North Carolina beaches ever see a piping plover.

These small shorebirds nearly became extinct in the late 1800s from hunting primarily for the millinery trade. Populations had recovered by the 1920s after being federally protected. Numbers have again declined and it has vanished as a nesting species from some areas. The most recent estimates by the U.S. Fish and Wildlife Service indicate that 722 breeding pairs of piping plovers were found along the entire Atlantic Coast of North America in 1985, 476 of which were in the United States. Seventeen breeding pairs were found around the Great Lakes and 1,439 pairs were estimated from the northern Great Plains in 1985.

North Carolina had an estimated breeding population of only 10 pairs of piping plovers in 1980 and 20 pairs in 1983. Recent surveys indicate that 25 to 30 pairs were present in North Carolina in 1986. It thus appears that the nesting population in North Carolina, the southernmost breeding site in North America, has increased over the past several years. This increase may be attributed to a southward movement of nesting piping plovers or it may be simply that early estimates of the nesting population were inaccurate.

Piping plovers began to get the attention of concerned biologists in the early 1970s. The National Audubon Society recognized the piping plovers' threatened existence and placed this bird on their "Blue List" in 1972. The "Blue List" is designed to identify North American breeding bird populations which are in potential danger. Piping plovers have remained on this list since 1972. The U.S. Fish and Wildlife Service declared the piping plover endangered in the Great Lakes region and threatened along the Atlantic Coast, northern Great Plains and in all wintering areas in 1986. Furthermore, piping plovers have also been declared endangered in Canada, and obviously their long term welfare remains questionable.

The piping plover (*Charadrius melodus*) is a small shorebird belonging to the family Charadriidae, the family of birds which also includes the familiar killdeer, common to fields and lawns across North Carolina. Piping plovers get their name from their very distincitive and somewhat nautical sounding call—peep peep peeplo. Early writers described the call as being "appealingly mellow, but wild" and being a "soft musical moan having a ventriloquial quality." The call is often heard long before the bird is seen and adds to the ghostlike quality of the bird.

Piping plovers are the smallest of the plovers found in North Carolina, measuring only 6 to 8 inches in length. Both sexes are similar in size and color having a sandy, grayish back (almost exactly the color of beach sand) and white underparts. Adults have a narrow, black neck band which may completely encircle the neck. It has the effect of visually dividing the bird into two parts, neither of which appears to be a bird—something called disruptive coloration by biologists.

Piping plovers are avian beach bums spending much of their lives on coastal or lake-front beaches. They breed sparingly along the Atlantic Coast from Newfoundland to North Carolina, around the Great Lakes and in the northern Great Plains of the United States and Canada. Nesting habitat includes sandy beaches along the coast and on inland lakes, bare areas on natural and dredged-material islands in rivers, salt-encrusted bare sand and gravel areas, and pebbly mud on interior alkali lakes and ponds. Piping plovers winter on beaches along the Atlantic Coast from North Carolina southward to Florida, the Bahamas, West Indies and along the Gulf of Mexico.

Food for this small, beach-dwelling bird consists primarily of fly larvae, beetles and marine worms which it picks from the surface of the sand. The plovers feed by darting across the sand for short distances, stopping, scanning the sand for any sign of food, then capturing and devouring the food. When capturing marine worms the bird grabs the worm in its bill and carefully walks backwards pulling the worm from its burrow so that the worm does not break in the process. The worm is then eaten whole.

As spring arrives and the temperature begins to rise, the piping plovers' attention turns toward courtship and nesting. Adults arrive at nesting sites in late March and April, often returning to the same sites where they nested the previous year or to sites where they were raised. Upon arriving at nesting sites, males establish a territory which may range from 500- to 8,000-square meters. Males perform elaborate flights and threat displays to establish and maintain territories. After territories are established the courtship process begins. Females are actively courted and a pair bond is soon formed.

The first records of piping plovers in

JAMES F. PARNELL

The rare piping plover *nests on open sand, especially near inlets. Both adults and young are well camouflaged and tend to remain motionless, making them difficult to spot.*

WILLIAM WALKER GOLDER

The least tern *frequently shares nesting sites with the piping plover, but is far more common along North Carolina's Outer Banks.*

North Carolina were by Thomas G. Pearson who observed four birds at Pea Island in May 1898. They were first discovered nesting in North Carolina at Pea Island in 1901. Nesting sites have since been found on Hatteras Island, Ocracoke Island, Portsmouth Island, Shackleford Banks and Sunset Beach.

A typical piping plover nest in North Carolina is a small depression in the sand usually lined with small, bleached shell fragments and most often on open, wide sandy stretches of beach similar to those associated with inlets and capes. Nests are usually in areas of sparse vegetation; however, nests at the base of vegetated dunes or sandy lumps have been reported. Piping plovers are often found nesting in and around least tern colonies which also are often on open, bare sandy beaches. Four creamy, buff-colored eggs are typical. The eggs have a peppering of fine black, brownish-black or purplish-black, evenly spaced markings. They are very similar in size and color to those of least terns which are more elongate and have larger unevenly spaced markings.

Both parents participate equally in incubation which lasts approximately 28 days. Newly hatched piping plovers are capable of leaving the nest within a few hours after hatching, but will remain in the general area for several days. Piper chicks look like speckled cottonballs on toothpicks. They are about 2 inches tall and are so well camouflaged against the sand that they are almost impossible to see. Chicks usually attain capability of flight at 25 to 35 days after hatching.

Piping plovers are experts at keeping their nesting sites secret. When a predator or human approaches a nesting site the incubating adult will quietly leave the nest and attempt to attract the intruder away from the area. The adult will run along in front of the intruder (keeping a safe distance) attracting attention away from the nest. If simply running along in front of the intruder does not work, the adult will act as it it has a broken wing or in some instances will lie flat on the ground with both wings spread, kicking sand with its feet, appearing to be entangled or extremely sick and weak. These displays are usually accompanied by calls which may lead a predator to believe that the bird can be easily captured. Recovery is rapid when the intruder has been attracted well away from the nest site.

Development and recreational use of beaches have destroyed many nesting sites. Damming and channelization of rivers along with other factors have eliminated sandy islands which are used by piping plovers nesting. Wintering habitats have also been disrupted by increased recreational use of beaches.

The fate of the piping plover is dependent on man. It shares our beaches and is dependent on these sandy barren habitats for its very life. Its new endangered or threatened status will provide some assistance, in that governmental agencies must consider it when permits are requested for environmental alterations. Increased publicity may also have a positive impact if more of us become sensitive to the needs of this native beach dweller.

This spring and summer, keep a close watch for these rare shorebirds. You may be one of the few North Carolinians to see —and recognize—these birds. Of course, you could see one and never really "see it." They aren't called ghosts for nothing. ⊠

DOING SOMETHING WILD

A quarter of a million North Carolina school kids have a more accurate understanding of our wildlife and the intricacies of nature thanks to Project WILD.

by Rick Estes

It seemed like a simple plan. I was going to set up a display of our educational materials and programs for the annual meeting of the state science teachers association, and then go back to the office. It seemed simple enough until I parked outside the McKimmon Center in Raleigh and started unloading Project WILD books and buttons. Some teachers spotted my Wildlife Commission uniform and the Project WILD logo, and asked me about the program. That was the beginning of a two-day marathon of questions and answers about an innovative and popular outdoor education program.

It's been that way since 1982 when Project WILD was introduced in a few states around the country. The program was created by the Western Regional Environmental Education Council and the Western Association of Fish and Wildlife Agencies. Project WILD has now been sponsored in 39 states and 3 Canadian provinces, and continues to grow.

Project WILD is a wildlife education program for youngsters in kindergarten through grade 12. It teaches kids about wildlife and the environment through several subject areas, including language arts, mathematics, art, physical education and social studies, as well as science. The program materials consist of an elementary and a secondary teacher's guide, and each guide has 80 activities for teachers to use with their students.

Project WILD is not another course for teachers to add to their curriculum. The activities in the teachers' guides fit easily into topics already being taught, and perhaps just as important, they are fun.

So, it's not Project WILD's unique design alone that makes it such a popular program. The learning activities in the WILD books (WILD stands for Wildlife in Learning Design) were created to actually involve children in the learning process. There are simulation games in which students "become" deer and the components of habitat—food, water, and shelter.

This activity is called "Oh! Deer," and some of the students play the role of the deer, while the others represent the food, water, and shelter by using signals to show

***Rick Estes** directs Havelock teachers in the "Habitat Lap Sit," a Project WILD activity that illustrates how wildlife needs food, water and shelter within its range to survive.*

TERRY SHANKLE

which they are. As the "deer" find and capture other students, the deer herd grows, sometimes getting too large for the habitat to support. When deer begin dying for lack of the essentials, some kids begin suggesting ways to keep the herd in balance with its habitat. This can involve improving the range by adding more food, or removing deer periodically by means of deer hunting or large predators. "Oh! Deer" is fun, but it also teaches some important lessons about wildlife, habitat, and people.

In another activity, students create an animal that is uniquely adapted to survive in a habitat which the students also design. "Adaptation Artistry" produces some pretty weird critters, but they are always able to "survive" in the habitat for which they are created. I've seen "Mountain Rock Eaters," "Peakollugagons," and "Cool Blues," all products of vivid imaginations, but all explaining how adaptations help animals live.

There are also activities which ask the students to improve the wildlife habitat in their own communities; to calculate the miles per gallon of water that animals can travel; and to learn to distinguish between real and make-believe animals in books and cartoons. All these activities encourage students to develop their creative and critical thinking skills. The goal statement of Project WILD is to teach children how to think, not what to think, so that they can make wise decisions and take positive actions on wildlife and environmental issues.

Add to these characteristics the fact that Project WILD was basically designed by educators, and it's easy to see why it is so popular with teachers.

In North Carolina, Project WILD is sponsored by the Wildlife Resources Commission. The money to become the sponsoring agency and to purchase the teachers' guides has come from the Nongame and Endangered Wildlife Fund. This fund was created by the General Assembly in 1983, and is supported by citizens' contributions through their state income tax refunds.

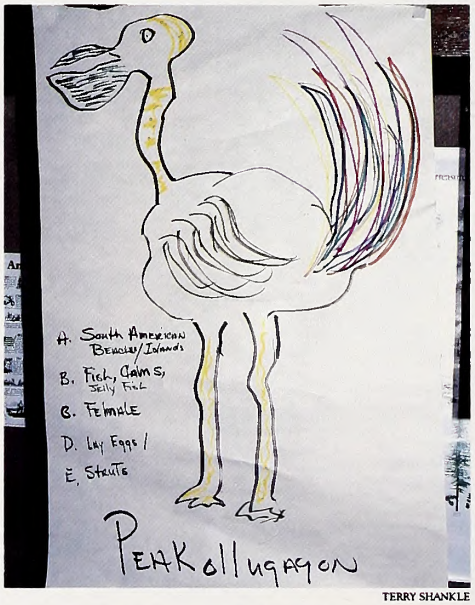
Since August 1984, when Project WILD officially came to North Carolina, approximately 2,500 teachers have been introduced to the WILD materials. And the response has been positive.

A national survey conducted by Project WILD shows that 71 percent of the teachers who have been given a WILD guide through a workshop have used the materials. In North Carolina, the number is even higher—82 percent of our teachers said they have used WILD to teach their classes.

There are some other interesting numbers from the survey. Nationwide and here in North Carolina, 99 percent of the teachers who have attended a WILD workshop have rated it "excellent" or "good." Additionally, 93 percent of our teachers said, "As a result of instruction stemming from Project WILD, my students have increased their knowledge" about what wildlife is and what it needs to survive. And 85 percent said their students now know more about the overall importance of wildlife and its habitat.

RICK ESTES

***Students at** Bugg Elementary School in Raleigh learn how deer herds fluctuate by playing "Oh Deer." Students assume the role of deer, then compete for food, water, shelter and space.*



TERRY SHANKLE

***Adaptation Artistry** draws upon the imagination of students by having them design a bird adapted to a particular habitat. This activity is used by all age groups, and shows how animals fit into special niches in the environment.*

Why should we be concerned that youngsters learn about wildlife when they are being asked to study computers, higher math and foreign languages? Simple. The natural resources that support wildlife species also support us. And whether we like to admit it or not, those same natural resources are the only real wealth we possess. Regardless of the actions we take today—positive or negative—it will be our children who determine the ultimate fate of our streams and lakes, our fields and woods, our wildlife and our own species.

Project WILD will not solve our wildlife or environmental problems, but it can be an important part of the educational process that must be completed. And it is no small undertaking. North Carolina's public schools enrolled nearly 1.1 million children in September 1986, and have over 40,000 teachers in their classrooms. Through the 2,500 teachers we've reached in Project WILD workshops, approximately 250,000 youngsters have participated in WILD learning activities. But that's really only a small part of the total audience. It does not include youngsters in private schools, and even the public school audience changes

Environmental Workshops For Teachers

In addition to Project WILD, conservation education materials and workshops are also available through the CLASS Project and Investigating Your Environment.

The CLASS Project was developed by the National Wildlife Federation, and is a set of activities that teaches about wildlife, forests, wetlands, hazardous substances, energy and environmental issues. The CLASS Project is best for teachers in grades 4 through 8, and classrooms may be certified as National CLASS Project classrooms by the Federation for completing a local project.

A CLASS Project workshop requires approximately three hours and is free of charge. We like to have about 20 educators sign up for the workshop, and we will arrange a date and location in your area.

For more information on Project WILD or CLASS Project workships, contact Rick Estes, N.C. Wildlife Resources Commission, Division of Conservation Education, 512 N. Salisbury St., Raleigh, N.C. 27611, (919) 733-7123. Or contact your area conservation education specialist:

Jay H. Davies
Route 3, Box 409K
Sylva, N.C. 28779
(704) 227-7260

Kay Scott
Route 5, Box 193-A1
Morganton, N.C. 28655
(704) 433-6123

Terry E. Shankle
Route 2, Box 224B
Denton, N.C. 27239
(919) 241-2388

Jane M. Rohling
67 Willow Way
Chapel Hill, N.C. 27514
(919) 933-5468

Michael E. Overton
P.O. Box 10
Edenton, N.C. 27932
(919) 482-7388

Lawrence Musselwhite
5007 Barefoot Drive
Wilmington, N.C. 28403
(919) 791-3734

Investigating Your Environment materials are used in five outdoor education workshops that are offered jointly by the Division of Forest Resources and the Wildlife Resources Commission. These workshops are each five days long, and offer three certificate renewal credits or three continuing education units. The dates and locations of this summer's outdoor education workshops are as follows:

June 15-19: Clemmons Educational State Forest, Clayton

June 22-26: Bladen Lakes Educational State Forest, near Elizabethtown

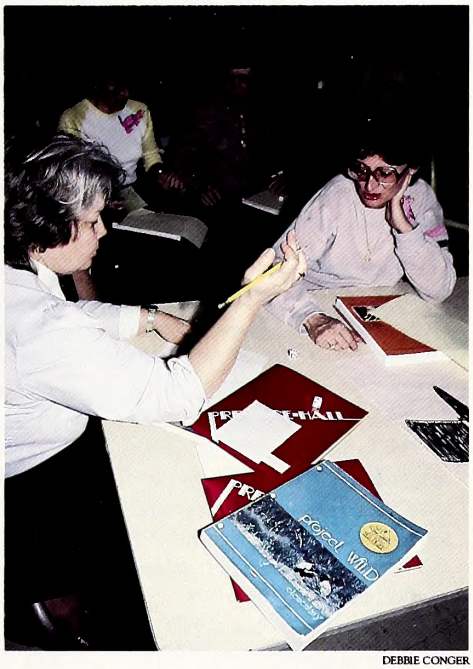
July 6-10: Rendezvous Mountain Educational State Forest, N. Wilkesboro

July 13-17: Tuttle Educational State Forest, Lenoir

July 20-24: Holmes Educational State Forest, Hendersonville

These workshops focus on the process approach to learning, and really offer a methods course in using the outdoors as a classroom. Investigations in soils, water, forestry and wildlife are combined with group activities on questioning strategies and techniques, designing investigations and using simulations.

For more information, or to register for an outdoor education workshop, contact Virginia Bass, Division of Forest Resources, Archdale Building, 512 N. Salisbury Street, Raleigh, N.C. 27611, (919) 733-2162.



DEBBIE CONGER

***Teachers examine** curriculum guides at a Project WILD workshop. Activities are designed for students from elementary through high school level, and may be used to teach science, biology, social studies, mathematics and language skills.*

constantly. As new families move into our state, and as youngsters start school for the first time, we find a whole new group of future decision makers to work with.

And even as our audience and our environmental problems change, so too does Project WILD. During 1985, six writing conferences were held around the country, including one here in North Carolina, to develop activities dealing with aquatic habitats and wildlife. These conferences developed a final draft of 30 new activities and 80 extensions of existing WILD activities that will be field tested in schools this fall. The finished version of the aquatic supplement will be available to teachers when schools open in September.

We are also planning to match up all activities in Project WILD with the topics teachers teach in the various subjects in all grade levels. This will make it even easier to incorporate WILD lessons into teachers' lesson plans, and a copy of this correlation will be given to teachers who attend a Project WILD workshop.

These lessons really do fit into what's already going on in our classrooms. For one day in the fall of 1984, all the teachers at Bugg Elementary School in Raleigh taught all their classes using Project WILD activities. Helena Mozella, a fourth grade teacher at Bugg, commented on the lessons, "I had no problem finding activities for every single subject that adapt to every single student—they fit everywhere, in every way. All of these (Project WILD) activities adapted to every child."

With all the pressures that our wildlife and its habitat are facing today, our children will face some important decisions in the near future. Their ability to look at issues objectively, to gather and apply data to environmental issues, and to take positive actions will determine the ultimate future of our wildlife resoures. Their capacity to care about those resources and the natural systems that support them will determine their own future. ⊠

New Project Leaders On Board

Nongame Wildlife Program Gears Up For Spring

Written and Edited by Mark Taylor

North Carolina's two new nongame project leaders are gearing up for the spring season, one of the busiest times for the nongame program.

"The endangered peregrine falcon restoration project occupies most of our time from April through June," said Allen Boynton of Morganton, nongame project leader for the mountains. "We hope to have as many as three to four 'hack' or release sites, and to release as many as six falcons at each site. It all depends on how many birds are available.

"During the summer, we'll also work with Dr. Peter Weigl of Wake Forest University to help map the range of the endangered northern flying squirrel. Last year, we concentrated on the areas where we knew there were squirrels. This year, we'll probably look at some areas where we feel these animals lived in the past, and see if populations still exist. We also plan to work with the N.C. Museum of Natural Sciences on the Virginia big-eared bat project. We hope to find their maternity roost in North Carolina, and ensure that it is adequately protected from disturbance."

Boynton has worked for the Commission since 1979, and holds B.S. and M.S. degrees in forestry and wildlife and natural resources planning from Virginia Polytechnic Institute and the University of Vermont. Prior to becoming nongame project leader, he served as area biologist, management biologist, and wildlife forester in the mountains.

A restoration project for endangered bald eagles at the coast will continue this spring.

"We've got one release site at the Lake Mattamuskeet National Wildlife Refuge," said Tom Henson of Chocowinity, nongame project leader for the coastal region. "There are two towers with a total of six cages, and we hope to release as many as 12 bald eagles from that site. Once again, however, it depends on how many birds are available. The birds usually arrive in mid-May and are generally held for about four weeks in the cages before being released. It just depends on their age.

"During the summer, we'll be working on sea turtle management. Loggerhead sea turtles nest from mid-May through mid-August with the peak nesting occurring in June and July. A network of volunteers along the coast monitor the beaches for nesting loggerheads. If nests need to be protected from predators, volunteers place protective wire mesh over the nest. These individuals also report strandings of sea turtles. For the last couple of years, we've had about 470 sea turtles nest along the coast."

Henson holds a B.S. and M.S. in forestry and wildlife management from the University of Tennessee. He has worked with the Commission since 1975, and served as an area wildlife biologist and wildlife forester in the coastal region before becoming the coastal nongame project leader.

KEN TAYLOR

More To Come: *Mountain Nongame Project Leader Allen Boynton says that as many as 18 to 24 peregrine falcons may be released in the mountains this spring as the restoration project for this endangered species enters its fourth year.*

Record Tiger Muskie Caught

A Yancy County man set a new state record last fall when he caught a 31-pound tiger musky.

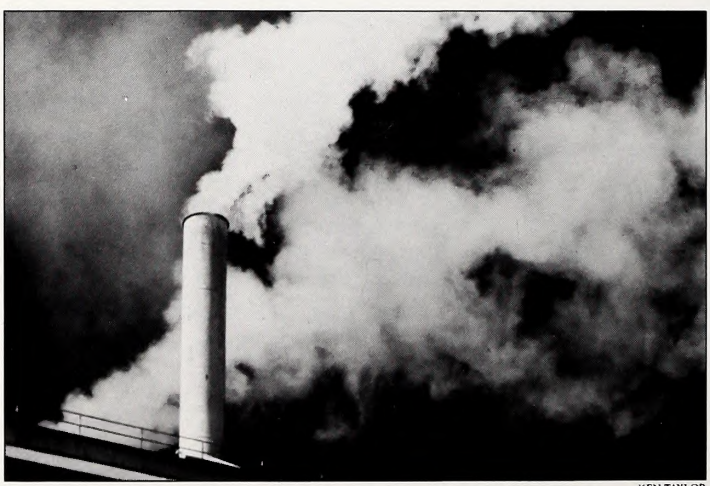
Chris J. Robinson, 22, of Burnsville, reported to the Wildlife Commission that he was bass fishing on Lake James in Marion when he hooked his 47½ inch-long fish. The Commission's Division of Boating and Inland Fisheries presents certificates to individuals who set state fishing records. The old state musky record was set in October 1983 when John Ray Effler of Marion caught a 23-pound, 15-ounce musky while also fishing on Lake James.

"I thought I'd snagged a carp in the side at first," Robinson said. "Then I thought the line was hung."

He followed the fish for one hour before he was close enough to wrap a towel around the fish's body, put remnants of a net over its head, and flip the fish into the boat. Robinson was fishing with 8-pound test line and an artificial spinner bait. Two friends fishing with him helped get the fish out of the water.

Information Kits Available

Observe National Wildlife Week



KEN TAYLOR

A Precious Resource: *Clean air is the focus of National Wildlife Week this year, and education kits including a teacher's guide focus on air pollution, acid rain, and other issues. Copies are available from the National Wildlife Federation, 1412 Sixteenth St., N.W. Washington, D.C. 20036.*

Winter Rains Helped

Trout Opener Will Be Normal Despite Summer Drought

Last summer's drought won't hurt fishermen when the trout season opens in a few weeks. The usual number of fish will be stocked in preparation for opening day, Saturday, April 4.

"We were very fortunate that last year's drought didn't hurt our trout stocking effort this year," said Richard Guier, mountain region fisheries supervisor for the Wildlife Commission. "We lost some fish at the Armstrong Fish Hatchery in Marion, but the water supply stood up at the Pisgah Forest Fish Hatchery, which is our largest facility. We were also able to obtain the eggs we needed late last fall, and had plenty of rain this winter. We were worried that we were going to have a dry winter and we'd be in bad shape going into the spring and summer, but that didn't happen. We plan to stock about 600,000 rainbow, brown and brook trout this year, which is about average."

One fish that will be missing from the hatchery trucks this spring, however, is the "Pisgah Forest golden rainbow," a strain of trout that is a pure yellow.

"This fish was originally developed at the Pisgah Hatchery back when it was administered by the U.S. Fish and Wildlife Service," said Jerry Hodge, Pisgah hatchery superintendent for the Wildlife Commission. The Pisgah Hatchery was transferred to the Wildlife Commission several years ago. "An oddball yellow rainbow with a few spots turned up in the raceways, and they bred it to a normal fish. After about three generations of crossing, you end up with a rainbow trout that's pure yellow. This is caused by a mutant gene, but it's not true albinism because the fish has quite a bit of color and does not have pink eyes. It's also not a recessive gene. If you cross these fish with normal rainbows, half the offspring are goldens and the others have normal coloration. We've maintained this strain, and stocked about 30,000 of the Pisgah goldens last summer. They were not stocked separately from other rainbows, and were pretty well scattered throughout our mountain trout streams.

"Unfortunately, we weren't able to produce any fish this year. The eggs may have been over-ripe or we may have had a bad male. We still have plenty of brood fish at the hatchery, though, and will continue to maintain the strain. Any surplus fish will be included in the stocking program next year."

Hodge says that the Pisgah goldens are a big draw at the hatchery and with fishermen.

"Everyone who stops by the hatchery wants to see the golden rainbows," he said. "Fishermen also like them. We didn't receive a single negative comment last year. Part of it may be because the goldens are easy to see in the water—they really stand out—but they're also a unique fish."

JIM DEAN

Coming Soon: *Trout season opens on Saturday, April 4, and approximately 600,000 brook, brown, and rainbow trout will be stocked throughout the season.*

Try These Recipes

Deerburger Makes Filling Dishes

March brings spring cleaning, and it's a good idea to extend this to the freezer. If there's still some "deerburger" on hand, here are two filling recipes that the whole family will enjoy. One was contributed by Karen Luszcz of Edenton, whose husband Dennis is the Commission's waterfowl biologist. The other is from Jackie Musselwhite of Wilmington, whose husband Lawrence is the conservation education field representative for the Southeast.

Porcupine Meatballs

1 cup uncooked white rice
1½ lbs. ground venison
1 small onion, chopped
2 cans tomato soup

Combine rice, venison and onion. Form meatballs and place in crock pot. Cover with tomato soup and 1 can water. Cook on low for about six hours.

—Karen Luszcz

Texas Hash

1 lb. ground venison
3 large onions, sliced
1 large green pepper, sliced
1 can (16 oz.) tomatoes
½ cup uncooked rice
2 tsp. salt
1 to 2 tsp. chili powder
⅛ tsp. pepper

Heat oven to 350 degrees. In large skillet cook and stir the meat, onion and green pepper until the meat is brown and the vegetables are tender. Drain off fat. Stir in tomatoes, rice, salt, chili powder, and pepper. Heat through. Pour into ungreased 2-quart casserole. Cover, bake 1 hour, stirring once or twice while cooking. Serves four.

—Jackie Musselwhite

New Brochure Available

Get Lowdown On Grass Carp

If aquatic weeds have fouled your pond, help is available. The UNC Sea Grant Program recently published a brochure which provides detailed information on the biology of grass carp, types of weeds it controls, when its use is feasible, effects on other fish, stocking rates and sizes, the procedure for obtaining permits, and a list of licensed dealers.

Copies of this publication are available from the UNC Sea Grant Program, N.C. State University, Box 8605, Raleigh, N.C. 27695. Ask for Blueprint #86-1.

Hanging Decoys Unsafe

Dove Hunters Beware Of Power Lines

Dear *Wildlife*,

Your magazine does a great service for sportsmen in the Carolinas by providing them with helpful hints on the best ways to snare the "catch" they seek on hunting forays. But in your December issue, there is a photograph with the caption, "Decoys strung in a tree or on a powerline really work." While it may appear to be a simple answer to a perplexing question of how to attract game, it is one that could end in tragedy for the hunter.

The power lines seen in the picture include a primary line that carries 7200 volts and a neutral line, on which the decoys are hung. The article does not mention how the decoys were placed on the line, but it would appear some type of telescoping device was used.

In either case, the danger to the hunter is apparent. Should the device used to place the decoys on the lower line touch the primary line, the likelihood of a serious accident is almost assured, leading to possible death for the hunter.

Safety in delivering our product is very important to Duke Power. We try to assure the safety of employees and customers by monitoring how our lines are positioned, and making sure they do not present a safety hazard to the public.

While we admire your efforts to pass along helpful tips to your readers, please be aware of the potential danger to hunters who decide that a power line is a pretty good setting for a decoy—it can also turn into a tragic trap for the sportsman.

—*John Francis*
Duke Power Company

And thanks to Duke Power for giving us a chance to pass along the warning. Although there are no recorded injuries in North Carolina from the rather common practice of using power lines to hang dove decoys, it's obviously a potentially dangerous practice. Incidentally, the technique for placing decoys doesn't involve a pole. Most use a string with a lead fishing weight attached to one end and the decoy tied to the other. The weight is tossed over the neutral line, then pulled up by the string (to remove the decoys, the weight is tossed back over the line). This could result in a fatal shock if the string is over the primary line and happens to be damp. The best advice is to avoid using any power lines to hang decoys and stick to natural trees or your own portable "tree" as described in the article.

Named Regional Director

Hyder Joins Wild Turkey Federation

The Wildlife Commission's former wild turkey project leader, Brian Hyder of Otto, was recently named the first regional director of the National Wild Turkey Federation. Hyder had served as the Commission's wild turkey biologist since 1981.

In his new position, Hyder will be responsible for developing a strong network of Federation chapters throughout the Southeast.

"We appreciate the valuable contributions that Brian Hyder has made to our wild turkey program," said Grady Barnes, assistant chief of the Commission's Division of Wildlife Management. "We're sure that Brian will continue to make important contributions to the management and conservation of wild turkeys in his new position."

Artificial Tree Yields Christmas Surprise

Mrs. Marie Stancil of Knightdale found a surprise when she went out to get her Christmas tree early one morning last December. One ornament was already in place.

"We have an artificial Christmas tree which looks real, and when I went out to our unused garage apartment where it was stored I noticed some straws sticking out of one side," she said. "There was a long, beautiful bird nest built on one of the branches. We'd seen lots of birds flying around the garage that summer, and apparently they'd gotten in and nested."

Mrs. Stancil took the tree into the house, placed several white marbles in the nest, and added a flannel redbird. The tree has been returned to the garage with its natural ornament.

"Apparently, the birds weren't bothered by nesting in an artificial tree," she said. "I hope they do it this year, too."

Teacher Enjoys Project WILD

Dear *Wildlife:*

I have a secondary guide of Project WILD (1983 edition) and would love to have a packet of revised activities. I think Project WILD is great and I really look forward to every *Carolina Notebook*. I am also eagerly awaiting the distribution of the aquatic supplements to Project WILD and the wildlife and habitat coloring books. Thank you for your time.

—*Michelle Crisp*
Robbinsville

Thanks for your compliments. Teachers and others involved with youth may receive a free subscription to the Carolina Notebook, *an environmental education primer published six times per year, by writing* Carolina Notebook, *N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.*

Odd Praise Appreciated

There are always far more letters arriving around here than we can ever publish although we try to answer all of them. Some offer helpful suggestions or criticisms, while others ask questions or are purely complimentary. Of course, we appreciate them all.

Recently, we received two letters that contained compliments we feel compelled to pass along. A postscript at the bottom of the first letter noted, "By the way, *Wildlife In North Carolina* is the most frequently stolen magazine in my office."

We consider that high praise, but perhaps no more so than the comment added to a letter we received from another reader about the same time.

"I think you folks ought to know that of all the many magazines cluttering up our office, *Wildlife In North Carolina* is almost invariably the magazine everyone grabs when they're heading for the 'reading' room."

Hey, who says the truth hurts? We love it. Incidentally, old issues are great for lining bird cages, too, but the pages are a bit too heavy for wrapping fish. We're working on it, though. Meanwhile, if you just want to save back issues, you might check out the special *Wildlife In North Carolina* binders we're hawking. They hold 12 issues and look great on a book shelf, even in the reading room.

Youth Deer Hunts Growing More Popular

Hunter safety, outdoor ethics, and youth involvement were spotlighted at the Wildlife Commission's youth deer hunts last fall.

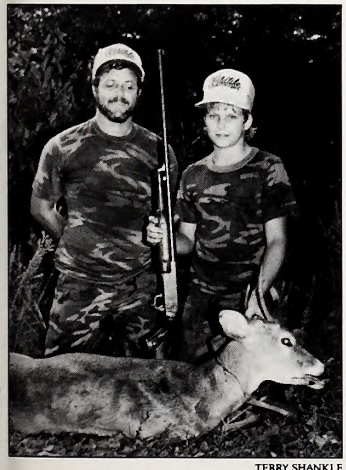
The two hunts took place on the Cowan's Ford Waterfowl Refuge in northern Mecklenburg County, and 65 young hunters accompanied by adult partners harvested 11 deer. All of the youths were 10 to 15 years old, and were chosen in a random drawing from the 187 applications for the hunt received by the Wildlife Commission.

"The main purpose of these hunts is to introduce young hunters to deer hunting, build a greater respect for firearms, and to instill in them a deeper appreciation for the outdoors," said Kim Garner, youth coordinator for the Wildlife Commission. "Before hunting, each youth and their adult hunting partner must participate in a modified hunter-safety course taught by a Wildlife Commission Safety Lieutenant. This course includes basic firearms safety and emphasizes outdoor ethics. The teams also receive an orientation about the refuge and rules governing the hunt."

The Cowan's Ford Waterfowl Refuge was also the site of the first youth deer hunt in 1985. Over the past two decades the deer herd on the refuge has increased to the point where it has exceeded the carrying capacity of the habitat. Deer also eat foods that are planted specifically for the ducks and geese that use the refuge.

"Each deer harvested was checked, weighed, and aged at the close of the hunt," said Harlan Hall, supervising wildlife biologist for the Piedmont. "All 11 deer were in poor to fair condition, which indicates that the deer population still exceeds the levels needed to maintain a healthy herd and minimize the possibilities of disease outbreaks."

—*Terry Shankle*



TERRY SHANKLE

A Proud Moment: *Jimmy Kaiser of Vale was one of 11 young hunters who bagged a deer last fall at the Wildlife Commission's youth deer hunt at Cowan's Ford.*

Outstanding Service Cited

Wildlife Officer Honored

KEN TAYLOR

A Job Well Done: *Wildlife Commission pilot Lieutenant Jerry Rich of Kinston (right) was recently honored as North Carolina's Wildlife Enforcement Officer of the Year at the annual meeting of the Southeastern Association of Fish and Wildlife Agencies in Baltimore, Maryland. Here, he receives a plaque from Colonel Jack Taylor, chief of law enforcement for the Maryland Department of Natural Resources. Rich has worked for the Wildlife Commission since 1966, and has also been stationed in Hudson, Spruce Pine and Weldon.*

The Wildlife Endowment Fund Report

The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife In North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Status on December 31, 1986

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	23,697	$6,999,378.10
Lifetime Hunting License	164	32,955.45
Lifetime Fishing License	1,454	263,200.28
Lifetime Subscriptions to Wildlife in N.C.	903	111,264.06
Contributions	—	81,508.18
Fund Total		$7,488,306.07
Total Interest Earned	$1,513,766.19	

Calendar Of Events

March 6-8
Annual Convention of the North Carolina Wildlife Federation at the Marriott Hotel on Hwy. 70 west in Raleigh. For more information contact the N.C. Wildlife Federation, P.O. Box 10626, Raleigh, N.C. 27605

March 13-14
7th annual Dixie Deer Classic at the Jim Graham Building at the North Carolina State Fairgrounds in Raleigh. Sponsored by the Wake County Wildlife Club, this popular event features competitions for the best trophy whitetail taken in the state in addition to displays of antlers, hunting equipment, and lectures and seminars on deer hunting and management. For more information contact the Wake County Wildlife Club, P.O. Box 12202, Raleigh, N.C. 27605.

March 14-15
"Put Something Wild In Your Life" program at the Schiele Museum of Natural History in Gastonia. This weekend event features displays and programs dealing with all aspects of wildlife conservation. On Sunday, such outdoor activities as nature photography and wildlife walks are planned. For more information contact the Schiele Museum, P.O. Box 953, 1500 E. Garrison Blvd., Gastonia, N.C. 28053.

The 1987 Wildlife Calendars have arrived.

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JOEL ARRINGTON

Sunset Silhouette

Day ends for this tri-colored heron perched in a tree beside a North Carolina salt marsh.

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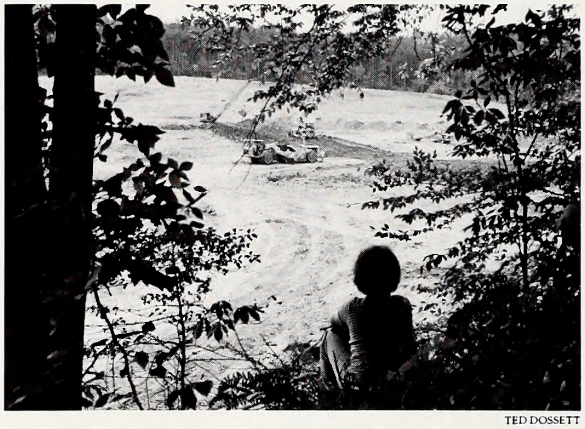
The Ignoble Savage

by Jim Dean

Sometimes you learn something so obvious that you wonder why it didn't occur to you long ago. "Well, of course," you say. "I should have guessed that." That's the reaction many of us had recently when we read that archaeologists in various parts of the world have accumulated evidence that primitive people were far more destructive of their habitat than originally thought. So much for the noble savage and his spiritual stewardship of nature.

It makes sense, of course, that early man was just as careless and destructive of his environment as we are today. Indeed, it flies in the face of reason to assume otherwise unless you believe that human nature has radically changed.



TED DOSSETT

Is it really big news to learn that Chaco Canyon in New Mexico was a pinyon-juniper woodland 1,000 years ago until the arrival of man. Today, it is a barren, rock canyon famous mostly for the ruins of huge stone-and-adobe "apartment" buildings as high as five stories. The Indian culture that spawned these buildings may have been as advanced as that of the Maya in Central America. So what happened to these people? Why did they abandon their handsome homes?

It turns out that the Indians clear-cut Chaco Canyon over a period of time—no doubt as rapidly as their primitive tools allowed—and when their life-giving environment disappeared, they were forced to move on. Similar evidence is found elsewhere around the globe. It is apparently no accident that Easter Island in the South Pacific experienced an early deforestation that created its present stark landscape. Early man was the culprit. Likewise, the Maori aboriginals of New Zealand unquestionably caused the extinction of a large, flightless bird called the moa.

In ancient southern Greece where man has been a continuous resident for 50,000 years, there is strong evidence that the wax and wane of early regional societies can be traced to man's destructive influence on his environment.

Jared M. Diamond, a professor of physiology at the University of California at Los Angeles School of Medicine believes that our glorification of the romanticized concept of the noble savage is an environmental myth.

"By nature, present-day man is neither more nor less destructive of the land than his forebears," he said.

It's certainly true that many tribes of American Indians spoke eloquently of their respect for nature, and indeed they seemed to grasp the cause-and-effect relationship of a healthy environment and human prosperity as well as anyone ever has. They were appalled by the sheer magnitude of the destruction and irreversible change wrought by white settlers. Yet, even these tribes systematically burned huge areas to drive wildlife over cliffs or into ambush.

What it boils down to is capability. A handful of stone-age primitives living 10,000 years ago, or even the Plains Indians of the 1800s, could destroy and pollute only so much. Besides, those wildfires may even have been beneficial in the long run. On the other hand, a nation of modern humans can threaten a planet.

Some of the destruction we see today is highly visible, but more and more of it is a subtle, creeping death that takes the form of polluted groundwater, acid rain or the loss of critical ozone in the atmosphere. Some of it is even more mind-boggling than that. Who'd think termites could threaten life on earth, for example?

Scientists have suspected for a long time that termites produce a very substantial quantity of carbon dioxide. Carbon dioxide is increasing in our atmosphere from many sources, creating a gradual long-term warming effect that could alter our climate with disastrous results. Termite populations world-wide have undergone explosive recent growth as a result of global logging. In simple terms, if you cut a tree, you encourage more termites which in turn release more carbon dioxide—enough, perhaps, to influence our climate. For sure, most of us are ill-equipped to understand or deal with such subtle threats, but of course, we can still die of ignorance.

One example of modern man's link to his careless ancestors is highly evident in North Carolina. For many years, we have expressed pride in the fact that our state is blessed with many natural riches which have not yet been fully plundered. We have looked at the strip-mined coal-producing states and claimed we would never make such a mistake (of course, we have very little coal here). Or we view the multiple problems facing the heavily industrialized Northeast and say we can learn from their mistakes. Indeed, we could learn from the experience of others, and we owe them a debt for showing us how. But will we? Our pride may prove unwarranted. The main reason we still have so much remaining natural wealth may simply be that until recently, we haven't had the manpower and resources to exploit our home. We're rapidly gaining that capability, and the next few decades will reveal our true nature.

Given the history of all noble savages to date, the future doesn't look too promising.

April, 1987
Volume 51, Number 4

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Cover *Honeybees visit every backyard in North Carolina, and although they aren't native to this continent, they contribute far more than just honey by pollinating many flowering plants. Photograph by Harry Ellis.*

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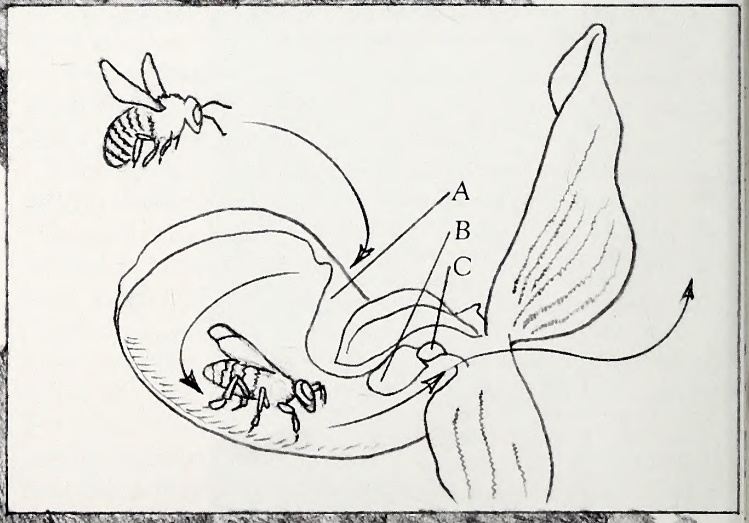
Following its instinct *to collect nectar, the bee will be trapped by this yellow lady's slipper, cross-pollinating the plant while struggling to get free. Drawn by the plant's odor and bright color, the bee (see boxed illustration below) will enter the pouch through the large hole (A). Once inside, however, the slippery sides of the pouch prevent the bee from getting out the way it came in. Instead, the plant's construction forces the bee toward two small openings near the stem of the plant. On its way, the bee comes into contact with the plant's pistil (B) where it will deposit the pollen it picked up from previous lady's slipper. As it squeezes out of one of the small openings, the bee will pick up a fresh load of pollen from the plant's stamen (C).*



Plants have evolved *many strategies to accomplish the work of cross-pollination. They offer "bribes" of nectar to attract insects, birds and even bats. Color, shape and odor also draw animal pollinators. Landing platforms help position insects so they touch the right parts of the plant. Lines on petals serve as nectar guides to draw the approaching insect to the right spot on the plant.*

The Sex Life of Plants

written by Lawrence S. Earley/illustrated by David Williams

In one of North Carolina's alluvial bottomlands you may find a curiously shaped yellow flower blossoming in April. The yellow lady's slipper is one of the most distinctive of our wild orchids, a pouchlike flower flanked by two twirled yellow petals and carried on a tall stalk.

Bees frequent this orchid in spring. A small bee will approach it, alight near the large opening in the "slipper" and disappear inside. With the benefit of the accompanying illustration, we see that once inside, the bee is prevented from withdrawing the same way it entered. Instead, it is encouraged to crawl toward the rear of the pouch, near the stalk. Through one of two smaller openings here the bee finally emerges, wearing a bright yellow splash of pollen.

Nature offers few actions more momentous, although commonplace, than the delicate choreography of the bee in the orchid. Indeed, every school child knows that the pollen carried by the bee will pollinate the next yellow lady's slipper the bee visits, thus beginning the fertilization process by which the plant produces seed to create the next generation. And yet what a remarkable "invention" this flower is. Its construction forces the bee, following its own instincts for honey, to move in such a way that it carries the plant's pollen from a precise spot on one plant to an equally precise spot on another plant.

Though a commonplace notion today, the pollination of plants by insects was virtually unsuspected until several centuries ago. Early botanists thought that pollination was accomplished by the plant itself, the pollen merely dropping from the plant's stamen to its pistil where it germinated (see illustration). Even after scientists began to suspect the role that insects played in pollination, they thought the insects carried the pollen from the plant's own stamen to its pistil. Not until the 18th century was it understood that a plant could only produce seed if it received pollen from another plant. It is through cross-pollination that the new seed is thus equipped with a mixture of genes that enables the species to constantly adapt to changing environments.

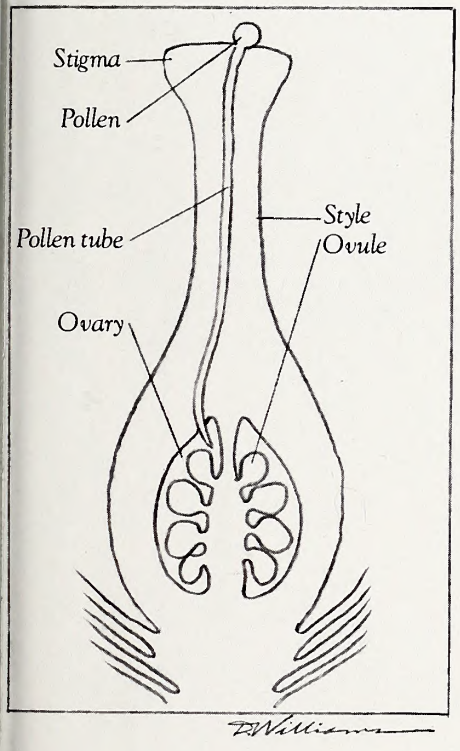
In the development of plants, then, this was the great problem: if, like an animal, the plant needed to "mate" with another of its species, how was it to do this while being plantlike, or rooted? One answer was to produce spores that could be blown by the wind. Ferns and other primitive plants do this. Another "answer" lay in enticing other organisms—insects, mostly, but also birds, bats and other animals—to do the work for the plant. This solution gave rise to the flowering plants.

Looked at in this way, flowers are little short of astonishing. To get the insect to perform the work of pollination, the plant offers "bribes," usually nectar, but also waxes, resins, oils and plant tissues, all necessary to the life cycle of a particular insect. Moreover, the plant advertises its rewards through the color, shape and fragrance of its flower. The very construction of the flower, the way its parts are arranged, ensures that when the pollinator comes for its reward, it touches the right part of the plant.

Some flowers have "nectar guides," or lines on the petals that lead the insect to the nectar where, along the way, it deposits or picks up pollen. Landing stations position the insect so that it touches the appropriate plant parts. Many flowers are traps for insects, causing them to rummage around looking for an escape and finding it exactly where it may pick up or deposit pollen. Some orchids imitate a female bee, enticing a male bee to attempt copulation and, in the process, to pollinate the plant.

Knowing that the lady's slipper is only a gaudy advertisement doesn't make it any less pretty. On a walk through spring woods it still brightens our spirits even as the unwitting bee goes about its homely and astonishing work.

***Fertilization occurs** when a pollen grain placed on a stigma germinates, sending a long tube down through the style. The tube enters the plant's ovary where the sperm released by the tube fertilizes the egg. The ripening ovary becomes the plant's fruit.*



***More information** on the subject of plant pollination can be found in the following references:*

The Story of Pollination, *by B.J.D. Meeuse. New York: The Ronald Press Company, 1961.*

The Secret Life of Plants, *by Anne Ophelia Dowden. New York: The Odyssey Press, 1964.*

The Sex Life of Flowers, *by Bastiaan Meeuse and Sean Morris, New York, Facts on File, 1984.*

NC-3510AA

Shellcracker Crazy

Redear sunfish aren't native to North Carolina, but they've certainly found a home here.

written and photographed by Jim Dean

The elderly man sat on an upturned bucket near the corner of the dam. Several cane poles were jabbed in the muddy bank in front of him, their corks motionless on the still pond.

I had been walking around the pond with my flyrod, casting a small popping bug anywhere I could find an opening in the alders and willows. It was a fine spring Saturday, the kind that calls you away from any more serious plans you might have made. I had worked my way around the pond until I reached the fisherman.

"Doing any good with that popper?" he asked.

"Few bluegills, but they've all been small," I replied. "I think I need a boat to get to the good spots."

It was at that moment that I noticed his string of fish in the edge of the water. There were several small bluegills, but there were also nearly a dozen much larger panfish finning weakly on the stringer. Several of them were pushing 20 ounces. They looked a bit like bluegills, and yet they were different somehow.

"Are those big ones bluegills, too?" I asked.

"Yellow bream is all I've ever heard 'em called," he answered. "They usually run bigger than bluegill bream."

"I haven't caught any of those," I said. "In fact, I'm not sure I've ever seen any before."

"You won't catch them on that flyrod," he said. "They don't eat nothing but bait like these crickets. I've never heard tell of one biting a popping bug."

***Panfishermen** on an old millpond watch their corks for the tell-tale bite that may mean a bluegill or shellcracker is checking out a cricket.*

***It's a widely held belief** that shellcrackers seldom take artificials, but they're suckers for a dark, sinking fly like this hard-bodied black ant.*

One of the corks on the cane pole bobbed a couple of times, then plunged into the depths. After a spirited, but brief tussle, the fisherman landed another big one and added it to the stringer.

"Here," he said, "try one of my poles if you want to catch one. They put up a heckuva scrap."

I did, and they did.

It's been a good many years since that day, and I didn't catch another "yellow bream" for a long time. Indeed, for much of that time I still didn't know exactly what they were, nor did I realize that not everything the old gentleman had told me was precisely true. Even today, these common panfish remain something of a mystery to many anglers.

The confusion begins with their names. You don't hear the term "yellow bream" much anymore in North Carolina. The more common name is "shellcracker," although the fish is actually the redear sunfish or *Lepomis microlophus* if you want to get scientific. To further confuse matters, a lot of fishermen lump shellcrackers and bluegills together and call both simply "bream."

One reason for this is the visual similarity between shellcrackers and bluegills (*Lepomis macrochirus*). Many fisherman have simply never learned to tell them apart, and it is not unusual to see them misidentified in newspaper photos. Shellcrackers are also frequently entered in contests as bluegills.

Still, if you know what to look for, it's fairly easy to distinguish the two species, and once you've learned the differences you can recognize them at a glance. After a shellcracker gets about the size of a postcard, it often develops a rather prominent yellow cast, especially around the throat and along the flanks. It also is likely to have a speckled appearance. A mature bluegill may also have a yellow or reddish-orange throat and flanks during spawning, but the color is usually more rosy, and there is no prominent speckling. Young bluegills are often very pale, while older ones may be a dark bluish color.

Color, however, is almost always a poor way to identify similar species because coloration can vary so much depending upon the maturity of fish, water quality, available food and other factors. Fortunately, there is a far more reliable way to distinguish shellcrackers from bluegills. The gill flap or operculum is perhaps the best visual key. On a bluegill, this flap is always a solid color, and in mature fish it is usually a dark bluish gray or black. Shellcrackers, on the other hand, have a pale yellow or reddish-orange border around the outer edge of this flap. In some fish, particu-

larly young ones, this border may be difficult to detect, but it's easy to see in adults.

For positive identification, fisheries biologists check inside the mouth at the throat. Shellcrackers, by the way, usually have somewhat larger mouths than bluegills, and it's easy to stick your finger in and feel the rough patch of grinding teeth in the shellcracker's throat. These grinding teeth are used to crush snails and other small pond crustaceans that are favorite foods for shellcrackers (perhaps we should call them shellcrunchers).

The shellcrackers' preference for such crustaceans is one of the reasons these fish are sometimes difficult to catch. They will eat insects, and often do, but because they are conditioned to expect to find food on or near the bottom, they do not look for meals on the surface as frequently as bluegills.

My elderly acquaintance of so many years ago may not have known exactly what he was catching, but he knew they'd take crickets fished near the bottom and in the shallows along the bank where the shellcrackers were spawning that May morning.

There is, perhaps, another reason why shellcrackers are sometimes misunderstood. They are not native to North Carolina. The original range of the shellcracker was from southern Illinois south to Texas and Florida, and the tall Appalachians in western North Carolina served as a natural barrier which kept these fish from becoming established in the state.

How did they get to North Carolina? And when? There are no stocking records from the early part of the century, but Lloyd Wright who is manager of the McKinney Lake National Fish Hatchery at Hoffman ventures a guess.

"Our records for this hatchery show that we were stocking ponds with 30 percent shellcracker and 70 percent bluegills as early as 1943," he said. "McKinney was built in 1937, and was the first Federal hatchery in

***Although anglers** often confuse shellcrackers and bluegills, the two can usually be distinguished by differences in the operculum or gill flap. Bluegills (above) have a solid color gill flap, usually grayish-blue or black. The gill flap on a shellcracker (below) has a lighter yellowish or reddish border.*

the state, so it's unlikely that any type of federal stocking took place before then. In fact, the first shellcrackers may have been stocked in 1939 when the Federal Farm Pond Program was initiated. Unfortunately, our records prior to 1943 were lost during the war, so we don't really know."

It's also unlikely that shellcrackers were stocked by the state before that time, although it is not unreasonable to assume that some of these fish may have been brought in by private landowners and stocked in some ponds. Since the 1940s, however, shellcrackers have been routinely stocked in ponds and lakes, and are well-established throughout the Piedmont and Coastal Plain.

While shellcrackers have a reputation for reaching larger size than bluegills, there is actually very little difference in their maximum potential. Indeed, the bluegill has a slight edge. North Carolina's state record bluegill is a 4-pound, 5-ounce fish caught in Henderson County in 1967 by Danny Case, while the state record shellcracker is a 4-pound, 4-ounce fish caught by Bill Arnold in 1968 in Lee County.

The all-tackle world records are also close. The record bluegill is a 4-pound, 12-ounce fish caught in 1950 in Alabama, while the record shellcracker is a 4-pound, 10-ounce fish caught in 1985 in Florida. In truth, however, shellcrackers do seem to weigh more on the average, and most likely, this is simply a reflection of food availability and growth rates.

The past couple of years, I've been fortunate enough to fall under the tutelage of an outstanding shellcracker and bluegill angler. Cliff Edwards of Louisburg has been managing farm ponds as a private consultant for several years, and he likes to test his results firsthand. That usually spells doom for several hundred crickets and a 48-quart cooler full of bluegills and 'crackers.

Cliff's basic technique is fairly simple. He fishes a fresh cricket a few inches off the bottom, and he keeps moving until he locates a concentration of fish. By fishing near the bottom, he catches both species. But if he fished his crickets near the surface, he'd catch far more bluegills than shellcrackers.

Both shellcrackers and bluegills have similar spawning habits, moving inshore to the shallows to spawn in April and May. Often, shellcracker beds will be in shallow water tight against the bank under overhanging brush. Saucer-shaped "beds" are scooped out on the bottom, and the female will normally lay several thousand eggs in the bed. These beds are usually grouped in colonies that may contain dozens of beds, sometimes a hundred or more.

Shellcrackers also spawn in deeper water, especially later in the season, and it is not unusual to find colonies of beds in 3- to 5-feet of water. Like bluegills, shellcrackers are easily caught when they are bedding, and once you find such a spot, it's not unusual to sit there and catch a coolerful. Keeping the fish is also considered good management since it can help keep a pond from becoming overpopulated with stunted fish.

Most fisherman who seek shellcrackers use bait, and crickets are certainly effective and easily available. The notion still persists, however, that these fish cannot be regularly caught on artificials.

That's simply not true. Cliff frequently switches to a small leadhead jig, and enjoys great success with shellcrackers, although admittedly he probably catches a larger percentage of bluegills. I've also had good luck at times on shellcrackers using the smallest size Beetle-Spins on ultra-light spinning tackle. Four-pound test monofilament is about the heaviest line you can use effectively with these small lures, however.

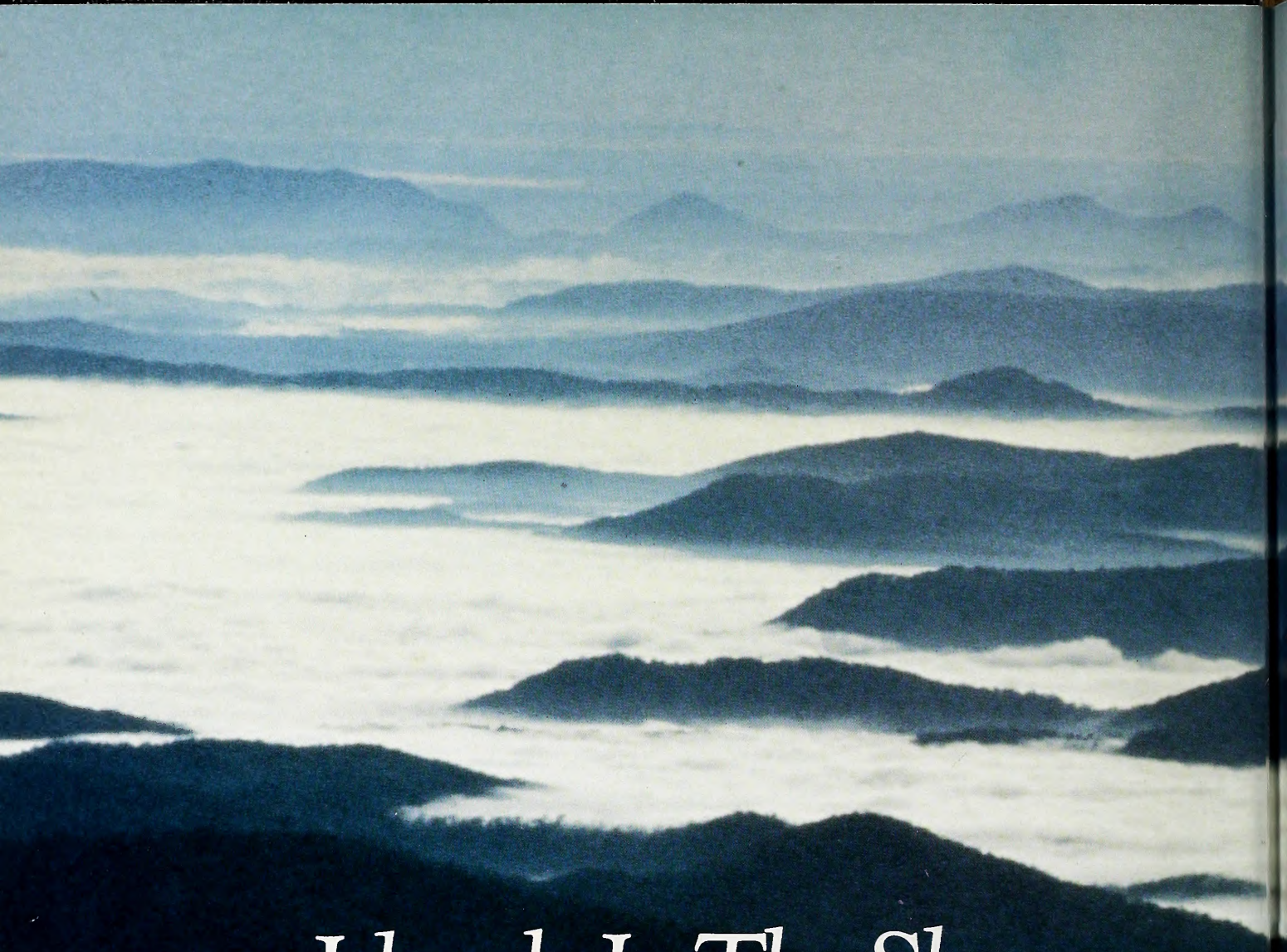
I prefer to use a flyrod for shellcrackers, and the technique is very simple. I've caught a few shellcrackers on popping bugs and other surface flies, especially when they are spawning in very shallow water, but you'll do far better if you use sinking flies.

Believe me, a shellcracker will eat a drab sinking fly as quickly as a bluegill if you put it in front of him. My favorite is a size 8 hard-bodied sinking black ant, and I sometimes fish two flies with one tied on a dropper and the second trailing about a foot behind. Pull that tandem through a bed of shellcrackers, and you'll very likely wind up with a fish on each fly.

Two years ago, Cliff and I joined several of his friends at one of the ponds he manages. We quickly located a large colony of bedding shellcrackers, and everybody was catching fish on crickets. I decided to switch to a flyrod, and probably caught as many as anyone using crickets. I know it took me two hours to fillet them, and they averaged about a pound apiece.

You can also use a flyrod and ants or other darkly colored sinking flies—nymphs or wet flies—over deep shellcracker beds or later in the summer when the fish are more likely to be scattered. The trick is simply to let your flies sink near the bottom and retrieve slowly to keep them there. Sometimes you can feel the strike, but it helps to watch the spot where your flyline is joined to the leader. If you see your flyline twitch, set the hook. It may take a while to get the feel of it, but once you do, you'll be rewarded for your patience.

The shellcracker may be a fairly recent immigrant to North Carolina's waters, but this colorful scrapper has certainly earned a big welcome. And somewhere in one of the more than 100,000 farm ponds in the state, there's undoubtedly a new state record waiting for you. Maybe even a world record. Got those crickets handy? And the black ants? ⊠



Islands In The Sky

Isolated by height and climate, the peaks of North Carolina's tallest mountains are separate worlds with their own unique plants and animals.

by John Alderman with Lawrence S. Earley

It was noon on a clear March day with temperatures around 55 degrees as I left Pittsboro to repair damages to research equipment near the crest of Grandfather Mountain. I felt confident that Arctic gear wouldn't be needed, but I packed it anyway.

That night I slept comfortably in a local motel near the mountain. The next morning I ate two breakfasts and was eager to challenge the mountain by carrying 100 pounds of tools, building materials, and other needed gear up 2,000 snow-covered feet of Grandfather's back. I left information about my plans with local officials and told them that I would probably not be down until the next day. My climb started at nine in the morning.

As I climbed the mountain, temperatures dropped and snow began to fall—slowly at first and then with increasing fury. As I approached the summit, I realized I was entering a very different world. Rime ice was everywhere with crystals extending three or more inches from their bases. Wind howled and trees creaked and moaned under their blanket of ice as gusts exceeded 60 miles per hour at times. Snow flew past my face and disappeared into the forest. As I stood among the clouds, I witnessed an incredible sight. As if great hands were at work, the thick clouds parted, revealing a deep blue sky above me and around me, as far as I could see, mountain peaks emerging from a sea of lower clouds. Then, just as quickly, the cloud healed its gaping wound, and all was gray again.

In a few hours I completed the repairs to the equipment and prepared for my night on the mountain. As I drifted off to sleep, my thoughts returned to the sight revealed when the clouds parted. The mountain tops were like islands, I thought, islands in the sky.

In a sense our tallest mountain peaks are islands. Just as oceanic islands offer refuge to terrestrial plants and animals, our tallest mountains provide refuge to many interesting and rare species.

To show how mountains and islands are alike in providing refuge, we must look at

Appalachian peaks *rising through cloud cover suggest the island existence of some of our highest mountains. Cold and wet, these mountain islands are separated from each other by warmer valleys. As a result, the peaks harbor many unique plants and animals.*

BARRY S. ROSEN

Islands In The Sky

our state more than 10,000 years ago during the last great ice age of the Pleistocene Epoch (2 million years ago to 10,000 years ago). During this last period of glaciation, ice sheets reached as far south as Louisville, Kentucky and St. Louis, Missouri. Spruce-fir forests extended in a broad belt from Missouri across Tennessee and into the Carolinas. During the Pleistocene, the more than 50 North Carolina mountains taller than 6,000 feet probably lacked trees at higher elevations, and their peaks may have been covered with snow throughout the year. Not only the mountains, but all regions of North Carolina were different during the last glacial period.

Because of the great quantity of water trapped in the ice sheets, sea-level was about 400 feet lower than it is today and the coast was many miles farther east. Therefore, none of North Carolina's coastal islands were islands during the Pleistocene. They were just part of the land area of our state. Animals were able to walk, crawl, or fly to these areas easily. The interior of North Carolina may have looked very similar to the boreal forests of Canada and the northeastern United States with spruce-fir forests probably dominating many areas. Moose, fishers, elk, and other boreal forest animals are believed to have lived here at that time.

Approximately 10,000 years ago, the last glacial period ended. As the climate became milder, the great ice sheets receded, sea-level rose, and the animals and plants responded to these changes. As the Atlantic Ocean rose and inundated coastal lands, animals were forced to higher ground along the coast and inland. Islands formed. These islands provided plant and animal species a refuge from the rising ocean.

Inland, major changes in animal and plant communities were also taking place. As North Carolina's climate became more temperate, the great boreal, or northern, conifer forest that occupied parts of the state was displaced by temperate hardwood species, such as oaks and hickories. The spruce-fir forest was following the ice sheets north, and with that habitat went the boreal forest animals.

In North Carolina, however, boreal plants and animals could retreat in another direction. Just as coastal species traveled to higher ground to escape the rising Atlantic Ocean, boreal forest species could move up mountains to find refuge from a warming

STEVE MASLOWSKI

***Isolation breeds** subtle changes in many species. The brown creeper (above) is a fairly common winter resident in the Piedmont and Coastal Plain, but on the high Appalachian peaks biologists have identified a rare subspecies of this bird.*

"sea" of air. In time (about 8,000 to 4,000 years ago), the main spruce-fir forest had retreated into the northern Appalachians, New England and Canada leaving behind islands of spruce-fir on seven of the highest peaks of the Southern Appalachians. About 18,000 years ago, the spruce-fir forest had spread over nearly 1.8 million square kilometers of the Southeast. Today the southeastern remnants are confined to 120 square kilometers of upper-elevation topography.

These high elevations (above 4,500 feet) are a congenial home for spruce-fir. The air temperature here is from 10 to 15 degrees cooler than at the mountain base during the growing season. Average annual precipitation commonly exceeds 65 inches. Although these forests are not, species for species, exactly like the boreal forests of Canada, there are enough similarities to allow boreal forest animals and other species adapted to a colder climate to flourish. Indeed, these areas are rich in rare plants and animals and in species that live nowhere else. In addition, the isolation enjoyed by these forests have produced interesting effects on the plants and animals that live there. These remnant spruce-fir forests today are isolated not only from the main populations farther north, but from each other.

These spruce-fir islands contain many rare and endemic species. Dr. Peter White, director of the University of North Carolina Botanical Garden, says that of the 23 plant species endemic or restricted to the Southern Appalachians, eight are confined to the spruce-fir forests. He says that there are several reasons for the sheer number of rare species here.

"For one thing," he says, "these forests are so rare in the Southeast that practically anything that grows there would be rare. Another reason rare plants are found here is that any plant becomes rare at its range limit, and some plants are at their range limits at the high elevations of the Southern Appalachians." Two such trees are mountain ash and northern red raspberry. The raspberry (*Rubus idaeus* ssp. *Sachalinensis*) is listed "significantly rare" in North Carolina. Though common in the north, it is uncommon in the south and found only in the high elevation spruce-fir forests.

White cites another reason why there are so many rare and endemic species in the spruce-fir islands of our mountains. It's directly related to the isolation that these islands have experienced over time. "If you had plant populations that were restricted to small geographic areas like these spruce-fir islands," White says, "they might develop a distinctive genetic composition over time—in fact this may have happened many times over thousands of years or tens of thousands of years. The net result might be a plant that may qualify as a different species from its nearest relatives."

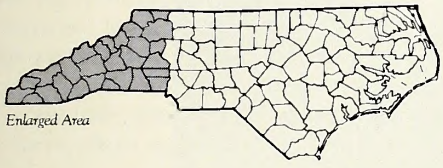
One example of this genetic divergence might be the large-leaved goldenrod (*Solidago glomerata*) which may be related to another goldenrod species in the north. Another example might be the Fraser fir (*Abies fraseri*) itself. It is related to the balsam fir which is the dominant fir in the spruce-fir forests of the north. Could the firs in our mountains have originally been balsam firs and then, after they were isolated from the main population, changed genetically into what we know as Fraser firs?

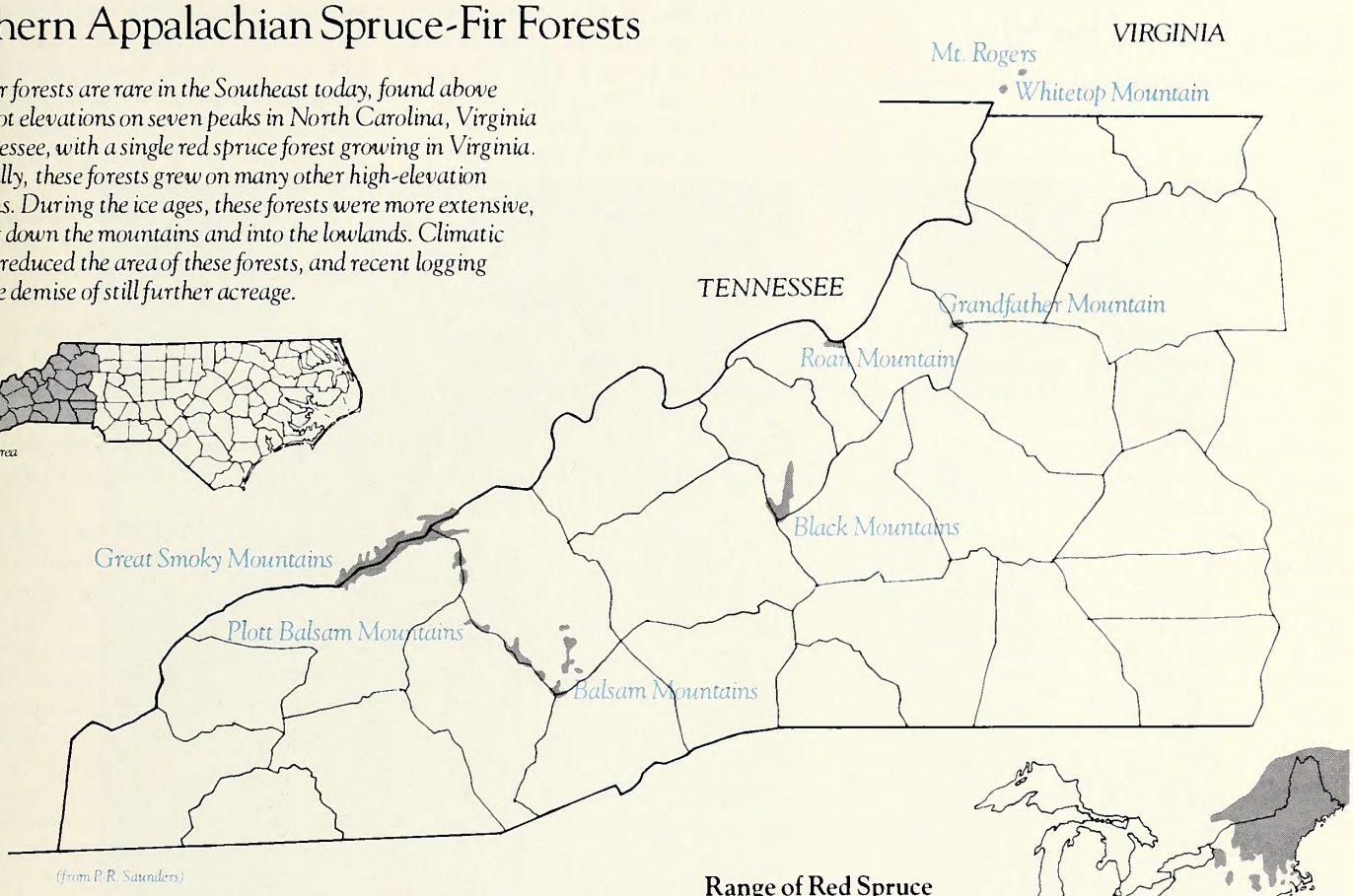
"It's hard to say," says White. "I don't know the answer. I've heard people express two opinions. One, that Fraser fir is a relatively recent product of evolution, occurring during the last Ice Age. Or that it had a much longer history and that it co-occurred with balsam fir at the height of the Ice Age."

Another effect of isolation on the plant life in these islands is the strange distribution of some plants in the spruce-fir islands. A

Southern Appalachian Spruce-Fir Forests

Spruce-fir forests are rare in the Southeast today, found above 4,500-foot elevations on seven peaks in North Carolina, Virginia and Tennessee, with a single red spruce forest growing in Virginia. Historically, these forests grew on many other high-elevation mountains. During the ice ages, these forests were more extensive, spreading down the mountains and into the lowlands. Climatic warming reduced the area of these forests, and recent logging caused the demise of still further acreage.





(from P. R. Saunders)

Island Rarities

Rare plants and animals are common on the spruce-fir islands of the Southern Appalachians. Some of the plants and animals in this illustration are found nowhere else (for example, Fraser fir and a subspecies of the northern flying squirrel). Many others are associated with spruce-fir forests but also share other Southern Appalachian high-elevation habitats.

Mammals

Masked shrew (*Sorex cinereous*)
Long-tailed shrew (*Sorex dispar*)
Pygmy shrew (*Microsorex hoyi*)
Northern flying squirrel (*Glaucomys sabrinus coloratus*)

Plants

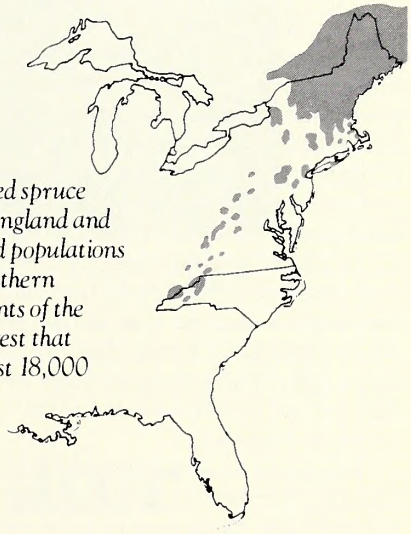
Fraser fir (*Abies fraseri*)
Bearberry (*Vaccinium erythrocarpon*)
Indian plantain (*Cacalia rugelia*)
Goldenrod (*Solidago glomerata*)

Salamanders

Imitator salamander (*Desmognathus imitator*)
Pygmy salamander (*Desmognathus wrighti*)

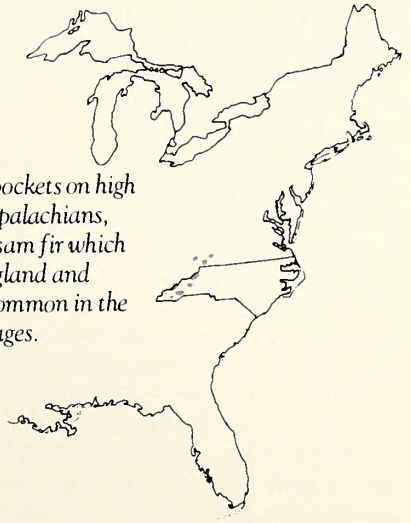
Birds

Carolina dark-eyed junco (*Junco hyemalis carolinensis*)
Appalachian black-capped chickadee (*Parus atricapillus practicus*)
Southern winter wren (*Troglodytes troglodytes pullus*)
Southern brown creeper (*Certhia familiaris nigrescens*)
Mountain solitary vireo (*Vireo solitarius alticola*)
Cairns' black-throated blue warbler (*Dendroica caerulescens cairnsi*)
Appalachian yellow-bellied sapsucker (*Sphyrapicus varius appalachiensis*)



Range of Red Spruce

The main population of red spruce today is located in New England and Canada. The small island populations of spruce found in the southern Appalachians are remnants of the widespread spruce-fir forest that flourished in the Southeast 18,000 years ago.



Range of Fraser Fir

Growing only in isolated pockets on high peaks of the Southern Appalachians, Fraser fir is related to balsam fir which is widespread in New England and Canada today and was common in the Southeast during the ice ages.

Islands In The Sky

good example of this is Rugel's ragwort (*Cacalia rugelia*) which is very abundant in the spruce-fir understory in the Great Smokies but which doesn't grow in any of the other spruce-fir islands. "It's totally an enigma why it's abundant in one place and not found in the others," White says. "If you could transport some seed to the Black Mountains it probably would colonize there." The seven other plants endemic to the southern spruce-fir forests are found in almost all the other islands.

What might be happening, says White, is that "with fluctuations in climate, some plants might go extinct in one area. The islands might be so small that after one bad year the plant might not reproduce." The result would be a sporadic distribution of the plant, growing healthily in one island and absent in another.

There are many rare birds in the spruce-fir forests whose origins are related to the isolation of this habitat. Conspicuously present in these forests are breeding birds usually associated with forests much farther to the north. At least 22 species of birds nest on these peaks, and seven of them have developed recognized subspecies unique to the Southern Appalachians: the Carolina dark-eyed junco, the Appalachian black-capped chickadee, the Appalachian yellow-bellied sapsucker, Cairns's black-throated blue warbler, the mountain solitary vireo, the southern brown creeper, and the southern winter wren.

How did these subspecies develop? "The reason is that there weren't many members of a particular bird species to begin with," says David Lee, state ornithologist with the N.C. Museum of Natural Sciences. "What happens is that one or two members produce a slightly different coloration, for example. This is constantly going on in any population, but in the general population up north this coloration might quickly die out. But because the population on these mountain peaks is so small, the colors get spread around relatively quickly." The potential for a change like this is greater on these mountain islands because the populations are smaller, Lee says.

Similar effects of isolation have been found in at least one mammal species associatied with spruce-fir ecosystems. Thirty-one mammals—or 40 percent of our state's mammal fauna—are found at the upper elevations. Some of them—white-tailed deer, bobcat, raccoon, red and gray foxes, opossum and gray squirrel—are common throughout the state. But five species are associated with spruce-fir: long-tailed shrew, masked shrew, pygmy shrew, rock vole and a subspecies of the northern flying squirrel.

This subspecies (*Glaucomys sabrinus coloratus*) is found on only a few mountain peaks in North Carolina and Tennessee, says Dr. Peter Weigl, professor of biology at Wake Forest University. During the last ice age the squirrel had a much broader range throughout the mountains and into the valleys, coinciding with the range of the spruce-fir forests. "But when conditions warmed, the animals gradually were confined to ridges, mountain tops and especially these spruce-fir islands," he says. These relict or remnant populations today are isolated from the main population of the northern flying squirrel, which ranges throughout Canada, as far north as Alaska, down into Oregon, Washington and California in the west, and New England and the Appalachians in the East. As a result, the squirrels on these southern peaks developed in slightly different ways. "They are not huge differences," says Weigl. "The northern populations have a slightly different coloration, and they may be a little larger. But their isolation accounts for the differences between them."

Does isolation always result in "genetic drift," as one scientist calls it? Not necessarily. Take the case of two salamander species that are endemic to the spruce-fir forests, the imitator salamander (*Desmognathus imitator*) and the pygmy salamander (*Desmognathus wrighti*). (Pygmy salamander are also found on mountains that don't have spruce-fir, but they are considered relicts of a time when the spruce-fir forest was more widely distributed.) Since the warming period of post-glacial times, these two salamanders have been isolated from others of their species on the various spruce-fir islands in the Southern Appalachians. But neither species has undergone any apparent genetic change.

This may be somewhat unusual, because the mountains are rich in salamanders that have clung to specialized habitats in different locations and then developed different characteristics over time. One species, *Plethodon jordani*, has developed several distinct subspecies as a result of this process. A red-cheeked form roams the Smokies. A red-legged form lives in the Nantahalas. There's a black-bellied form in the Highlands area, and there is a distinct form found at upper elevations in the spruce-fir forests.

Populations of pygmy salamanders on different spruce-fir islands seem identical, as do the imitator salamanders, but it's possible that looks may deceive, says Alvin Braswell, curator of lower vertebrates at the N.C. Museum of Natural Sciences. "No one has done this yet," he says, "but if someone looked at the chemical make-up of these salamander populations, he might find that there are some differences between them that you can't see by holding them in your hand."

Because the spruce-fir ecosystem is so limited in the Southern Appalachians, it is vulnerable to many threats. What threatens the forest also threatens the species that are associated with spruce-fir. For those species such as the white-tailed deer that can exist as well in a lowland swamp as in a spruce-fir island, the demise of this ecosystem might not mean much. But for species that are restricted to it, any alteration might prove disastrous.

Five thousand to 7,000 years ago, these forests were threatened by a period of warming with average temperatures higher than those experienced today. The result was that no spruce-fir is found southwest of Clingman's Dome today. Logging and fire during the past 100 years have further reduced these forests by half. Peter White says that the most significant remaining stands of old-growth southern Appalachian spruce-fir forest are found on the Great Smoky, Balsam and Black Mountain ranges. Less extensive forests are found on Roan Mountain, the Plott Balsams, Craggy Mountains, Grandfather Mountain, and Mount Pisgah.

Today there are new threats to the spruce-fir islands in the sky. Acid rain and heavy metals are taking their toll on the ecosystems found there. The balsam wooly aphid, an introduced species from Europe, is killing the Fraser fir throughout much of its range. If we act quickly, we may be able to correct these problems.

But there is still another threat which possibly cannot be reversed. Based upon the best scientific models available, the earth's atmosphere may warm significantly within the next 150 years because of carbon dioxide and other gases being pumped into the atmosphere. If this scenario holds true, humans will have an easier task adapting to rising sea levels and changing climates than animals and plants adapted to the cool, moist environment on our mountain peaks. These forests and the animals adapted to them will be forced into higher elevations and smaller areas. Some peaks covered with spruce-fir now may grow hardwood species instead.

If we can help ensure the continued existence of these spruce-fir forests, future generations will thank us for saving a part of North Carolina's distant past on our islands in the sky. ⊠

One-man boats *are a common sight on the Lumber and other blackwater rivers, and such boats have traditionally been used for fishing and hunting in the eastern part of the state.*

Boats For Blackwater

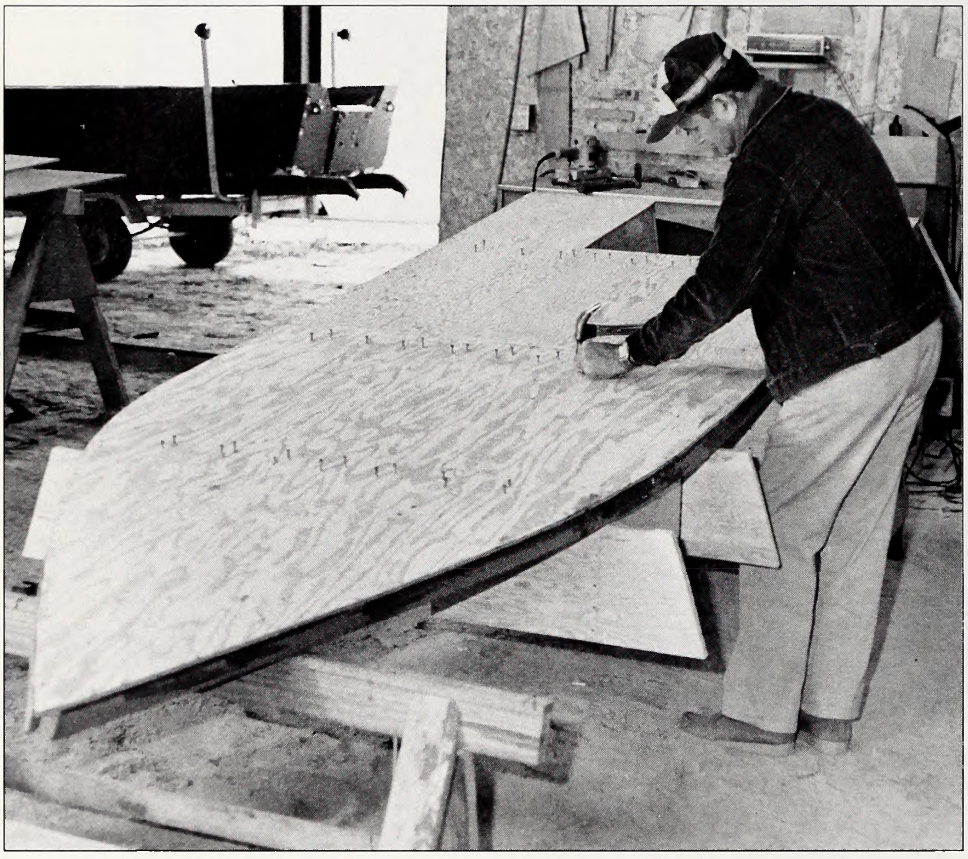
The standard for North Carolina's coastal river boats has been set by this small outfit in a ramshackle warehouse in Lumberton.

by Mark Taylor

photography by Ken Taylor

Southeastern North Carolina is laced with winding blackwater streams and rivers. These clear, yet dark-as-coffee waters drain the big forests of the Coastal Plain. Take a trip down any of these rivers—the Lumber, Black, or Waccamaw for example—and you'll likely encounter hunters or fishermen throughout the year. The first warm days of spring bring fishermen casting to the banks for robin or working nets during the shad runs. During the summer bream and bass fishing are popular. Fall brings squirrel hunters who quietly scan the treetops as they float down river, and

"My father, Lonnie Britt, began building boats with the Ivey brothers in an old tobacco barn during the 1940s. These were just old-fashioned swamp boats built of cypress planks. In 1948, he began building boats of marine plywood, and was the first man in this area to do so."



***James Hunt nails** a crosspiece to the inside bottom of a 16-foot net boat. These boats are widely used for clamming, oystering and other types of commercial fishing.*

later duck hunters seek woodies and mallards in the swamps and backwaters. Only in the dead of winter are the rivers deserted, and even then a warm day brings out a small hatch of anglers seeking to escape the close confines of home.

You'll see a few johnboats or canoes on these rivers, but most sportsmen fish or hunt from small, wooden, double-ended boats powered by electric trolling motors or by an occasional stroke of a small paddle held in one hand. "One or two-man boats" is all they're called, and these boats are as much a part of the river as the cypress trees that line the banks. People on the river swear there's no better boat for blackwater, and one firm—the Carolina Boat Company of Lumberton— is largely responsible for the development and continued popularity of these unique watercraft.

The Carolina Boat Company is housed in an old warehouse on the outskirts of Lumberton. Sawdust and wood chips cover the floor, and a visitor is immediately struck by the lack of machinery. The only large power tools in the shop are a Sears tablesaw, two Sears 12-inch bandsaws, an old six-inch jointer, and a small drill press. A selection of hand tools and small power tools is shelved over the work benches, and racks of jigs hang from the walls. Robert Britt and Bobby Wilkins, the owners of the company, are working on a boat when I arrive.

"My father, Lonnie Britt, began building boats with the Ivey brothers in an old tobacco barn during the 1940s," said Britt. "These were just old-fashioned swamp boats built of cypress planks. In 1948, he began building boats of marine plywood, and was the first man in this area to do so. People liked his boats, and what began as a sideline soon turned into a full-time business. The Carolina Boat Company was founded about 35 years ago, and he gradually bought out his partners although they continue to work here to this day. It's a very family-oriented business.

"Today, we build anywhere from 200 to 300 one- and two-man boats per year. Traditionally, these boats were paddled, but many people now equip them with electric trolling motors and foot-pedal controls. This is an ideal combination for fishing small blackwater streams, and we sell these boats as far south as Florida."

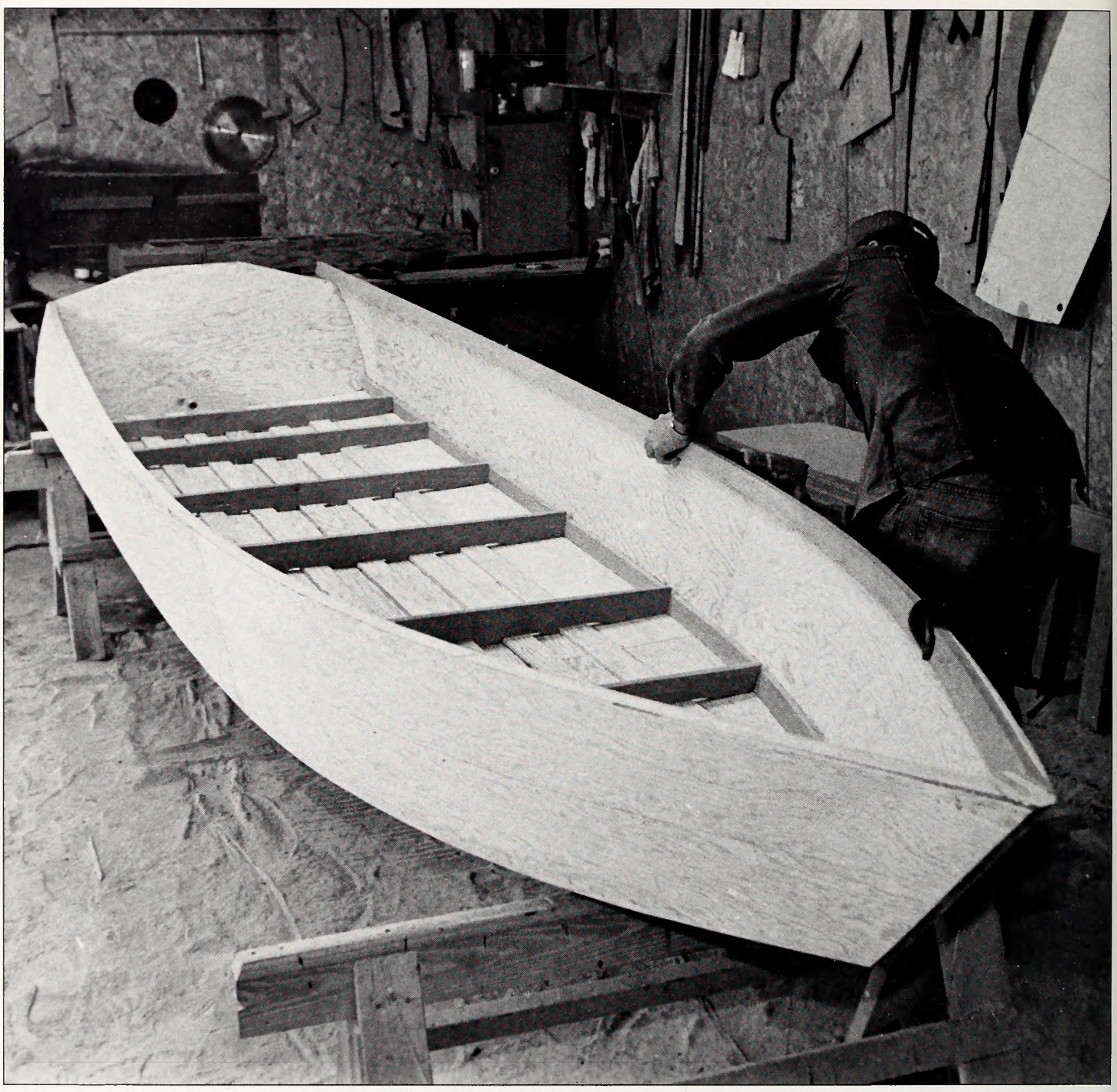
One- and two-man boats are narrow at the bow and stern with small transoms to accomodate a trolling motor or small outboard. They are flat-bottomed across the beam, and have a fair amount of curve or "rocker" throughout the length of the hull. The bottom and sides are cut from sheets of marine plywood, which comes in 10- to 16-foot lengths. Then, the bottom is laid across two sawhorses and bands of one-inch mahogany cut at a 20-degree angle are fastened to its outer edges. These bands force the bottom, and later the sides, into graceful curves. The stem, stern, ribs and sides are then fastened to these pieces. Gunwhales and a seat add rigidity to the hull. In the center of each boat is a fish box, a simple, four-sided box with a hinged top that is fastened to the bottom with a watertight seal. Several holes are then drilled through the bottom, creating a simple live well.

The only differences between the boats is size. The one-man boat, which is most popular, is 11 feet long with a 24-inch beam across the bottom and 10-inch sides, or with a 28-inch beam for a big man. The two-man boats are 12 or 14 feet long (12 feet is most popular) with a 30-inch beam and 12-inch sides.

"The construction of these boats is really simple, and we can build any of them in a single day," said Wilkins. "We use the same materials for all our boats. The bottoms and sides are made of ⅜ inch marine plywood and one-inch mahogany is used for the ribs, gunwhales and braces. Mahogany is used because it resists rot. Any tree that grows in

***Robert Britt fits** the transom to a one-man boat, a design his late father, Lonnie Britt, made popular after World War II.*

STUMPNOCKER
FISHING BOATS



***Lacey Hunt, Jr.,** specializes in building Conway skiffs which are fast, round-bottomed boats often used for duck hunting in coastal rice fields.*

wet areas is good that way. The boats are fastened with galvanized nails, brass screws, and waterproof, plastic-resin glue. Then the finished boats are completely sprayed with a sealer, the insides are varnished, and the outsides receive two coats of oil-based paint."

No one is quite sure when the one- and two-man boats evolved, but they did not become common until the past few decades. "I don't remember seeing many of these boats when I was young," said Lawrence Musselwhite of Wilmington. Musselwhite is the Wildlife Commission's conservation-education field representative for southeast North Carolina, and has lived in the area all his life. "There were probably a few that people who lived on the rivers built for their own use, but no one had the money to buy boats during the thirties. It wasn't until after World War II, when a lot of servicemen returned from the war and people had a little more money, that you started seeing folks doing much serious fishing."

The first one- and two-man boats Musselwhite remembers seeing after the war were planked boats made of cypress. They were common on the Lumber River and were probably used on the Black. Some were used on Waccamaw Lake and River, but even in the 1950s there were still quite a few dugout canoes on these waters. These boats were literally dug out of straight-grained cypress logs with an adz. Musselwhite found that most of the smaller boats on the Waccamaw were dugouts, but the bigger boats were planked because it was getting hard to find big cypress logs.

"I don't think the design for the one- and two-man boats came from dugouts because

Sawdust and wood chips cover the floor, and a visitor is immediately struck by the lack of machinery. The only large power tools in the shop are a Sears tablesaw, two Sears 12-inch bandsaws, an old 6-inch jointer, and a small drill press.

they had round bottoms," Musselwhite said. "In fact, some of the dugout builders began digging canoes that had the same lines as planked boats because they were more stable. These early planked boats had the same shape as the plywood boats do now, but were cross-planked across the bottom. People would seal the seams with cotton or tobacco twine, and once you put the boats in the water they'd swell up watertight within an hour. The boats soaked up water like a sponge, though, no matter how many coats of paint you put on them. They were really heavy, and if you took them out of the water the planks and seams would crack open as they dried. However, as long as they were kept in the water they were fine."

It wasn't until the early 1950s that marine plywood became readily available, and one of Musselwhite's first duties as a wildlife officer was to make some new, one-man boats for himself and the other officers in his district.

"The plywood boats were much lighter than the older planked boats, and you didn't have the problems with the seams and planks cracking. We found we could build a complete one-man boat from a single 14-foot sheet of marine plywood, although you wouldn't have enough scraps left over to start a fire. We built a few, and then Lonnie Britt began building them and we started buying from him. He built excellent boats, and as far as I know, the Carolina Boat Company is the only business that's ever built one- and two-man boats commercially."

Musselwhite found that although the boats were excellent for hunting, fishing and wildlife work, they easily capsized.

"The one-man boats are very tippy, although they're still not as bad as a dugout," he said. "However, you paddle these boats with one hand without making a ripple as you fish for robin, and you can also slip through the trees in a flooded swamp fishing in the spring or hunting in the fall. The two-man boats are quite a bit more stable than the one-man boats, and have most of the same advantages. Either of these boats are fine as long as they're used in small, sheltered waters."

The growing popularity of boating and fishing during the past three decades also prompted the Carolina Boat Company to make a line of boats for bigger waters.

"The one- and two-man boats are fine for small blackwater streams, but they aren't very seaworthy and don't handle well with outboard motors," said Wilkins. "Consequently, we began building bigger boats for use with small outboards on the lower reaches of the rivers and for lakes and coastal waters. All told, we probably build 20 different styles of flat-bottom, V-bottom, and round-bottom skiffs ranging from 12 to 16 feet."

***Bobby Wilkins** (left) and James Hunt trim the sides of fish boxes that serve as ribs in net boats. All flat-bottomed boats are built over forms.*

One particularly interesting boat is the Conway skiff, the company's only round-bottomed boat.

"The Conway skiff has a very slight curve in the bottom, which makes it ride better," said Britt. "It's a sleek, fast boat that has become very popular with duck hunters and fishermen in the coastal waters and rice fields around Conway, South Carolina. Bill Wood of Conway, South Carolina, brought us a planked Conway skiff in the early 1970s, and we began building them of plywood. These boats also have tabs, which are simply extensions of the sides and bottom a few inches beyond the transom. The boats are typically used with big outboards, and the tabs prevent the boat from squatting at the stern under power."

The V-bottomed and round-bottomed skiffs take slightly more time to build than the flat-bottomed boats, but the speed at which a boat is built is surprising. Wilkins was working on a flat-bottomed, 18-foot net boat when we dropped by, a job he estimated would take three days from start to finish. A V-bottomed net boat would take only five days.

"We don't do any steaming of wood here, and our construction is simple and solid," he said, as he used a framing square to mark the 20-degree angle on the side of one of the four fish boxes that also serve as ribs in net boats. "Still, we'll modify a boat any way a customer wants it."

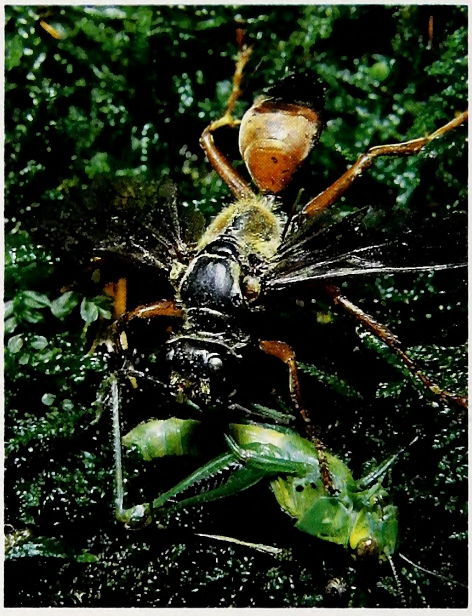
He stops and laughs. "We've built some that near about wouldn't work, but if that's the kind of boat a man wants, we'll build it for him." ⊠

Information on these boats is available from the Carolina Boat Company, 2008 East Fifth B. St., Lumberton, N.C. 28358 (tel. 919-739-6408).

Bugs In The Backyard

You don't have to go to another continent to find a jungle. There's a fascinating one behind a magnifying glass in your own backyard.

written and photographed by Harry Ellis



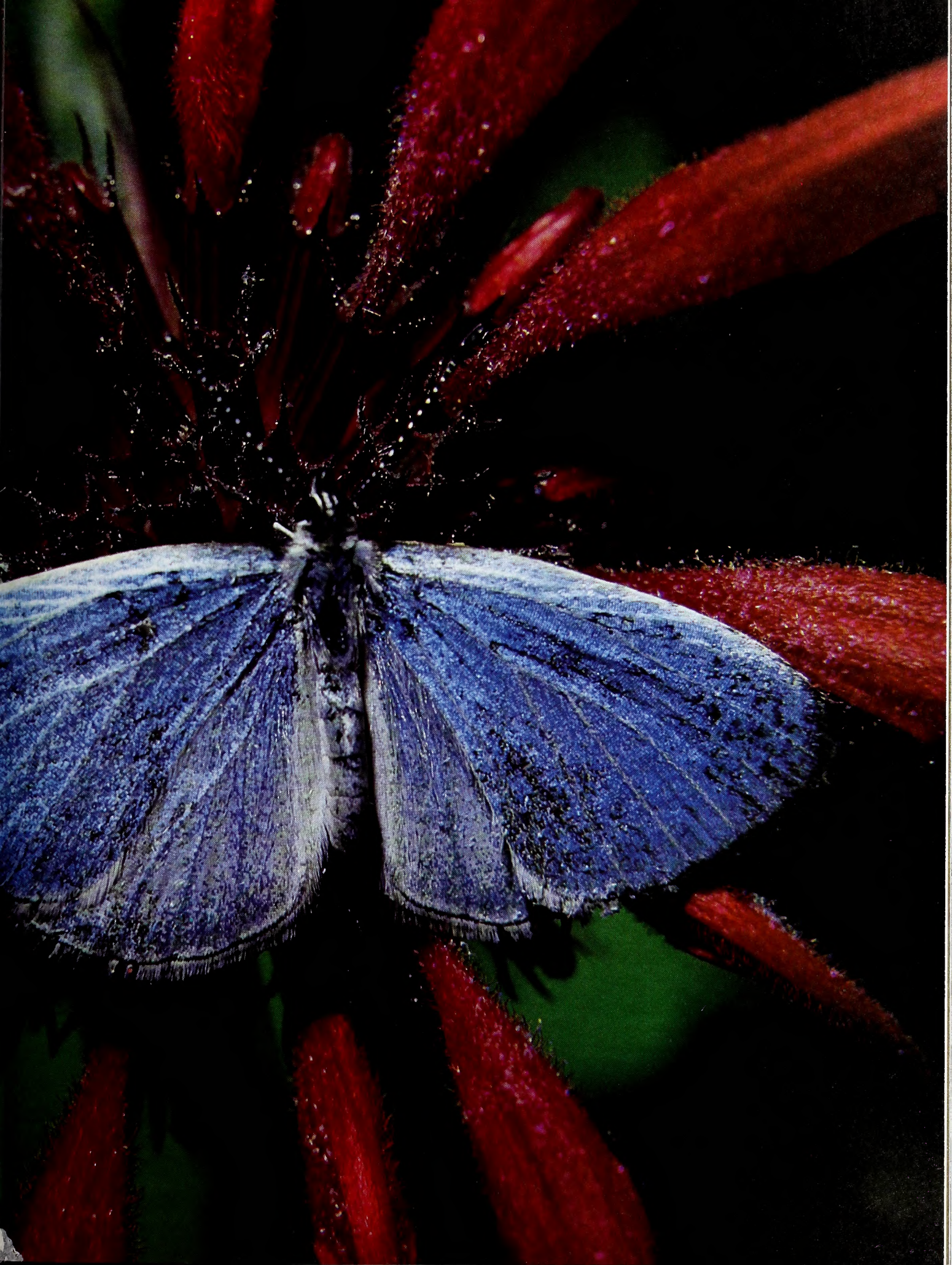
***Backyard drama occurs** when the parasitic golden digger wasp* (Sphex incyneumonsus) *captures a green katydid (above) and paralyzes it with a sting. The katydid will be buried in a burrow with the wasp's newly hatched egg. Once hatched, the egg will feed on the katydid's living body. At right, a common blue butterfly* (Incaricis icarioides) *displays its wings while perching on bee balm.*

For many years I have found relaxation and adventure in a new and different kind of hunting—stalking with color camera the insects living in and around my backyard. The camera records a world of fragile beauty in clarity and detail, permitting a deeper look into the lives of insects than is possible with our unaided eyes. With my explorations into this nearby realm of the insects has come the realization that it is not necessary to get in your car and drive long and expensive distances in order to see and experience the marvels and mysteries of nature; they exist no farther from us than our own dooryards.

There is nothing exceptional about my backyard. It is about average size, can be crossed in a few strides and is little different from thousands of others over rural or suburban America. There is a grassy plot lined with a few trees and just outside the mowed area, a tangle of weeds, briers and bushes. I purposely leave it a little ragged along the edges, sparing a few thistles, milkweeds and goldenrods.

Almost a million species of insects have been catalogued worldwide, and hundreds of new species are being added to the list every year. Probably over a thousand different kinds live in my back yard or will visit it within the course of a summer. Because they have invaded every conceivable ecological niche, we find them in all kinds of places—clinging to the leaves and bark of trees, running through the grass, tunneling beneath the soil, flying through the air, feeding and being fed upon.

Over many millions of years, insects have survived and multiplied. An ancient race going back almost 400 million years, they were already old when the dinosaurs roamed the earth. Through the ages, each species has developed its own specific behavior pattern and adaptations that enable it to



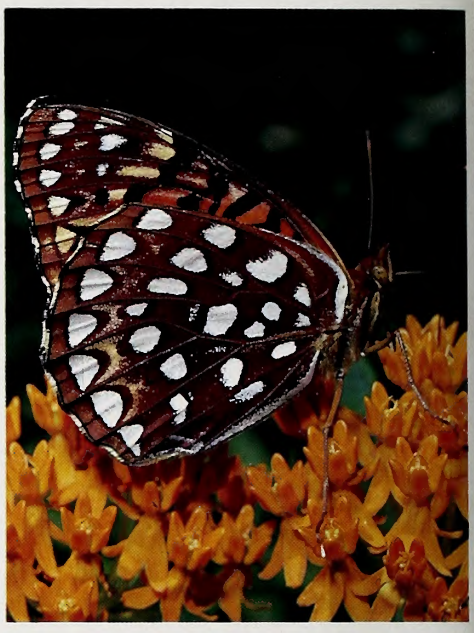
Bugs In The Backyard

escape its enemies and survive. There are walkingstick insects that resemble twigs, treehoppers that imitate thorns and praying mantis, katydids, and grasshoppers with camouflaging colors and patterns. To a predator intent on harming it, the large false eyespots on the tiger swallowtail caterpillar look like the wildly staring eyes of a snake, and the regal moth caterpillar is so hideous in appearance that is is known by common name as the hickory horned devil. Some insects that have poisonous stings or a bad taste advertise themselves with brilliant colors, to get the message out that they are dangerous, and some palatable species survive by mimicking the noxious ones.

Insects live in a Lilliputian world that is strange and alien to our own, a race of earth-creatures more incredible than anything that an astronaut may ever dream of finding in the reaches of space. Few if any living things rival the insects in their infinite variety of colors, with some of them displaying a radiance and beauty that seemingly surpass all functional need and purpose.

Among the most beautiful of all insects are the butterflies and moths. During the daylight hours, many species of butterflies are regular visitors to my lawn, especially along its outer margins, flitting from thistle to thistle and from goldenrod to goldenrod. There are swallowtails, fritillaries, Baltimores, painted ladies, red admirals, monarchs, and viceroys.

At night, the giant Saturniid silk moths are out—luna, polyphemus, promethea, and cecropia—shadowy, batlike forms flitting through the trees. Sometimes the big green lunas come and beat against my screened windows trying to get to the light inside, often tearing their lovely fragile wings. The sole destiny of these giant moths is to quickly find a mate, lay their eggs and die; then the cycle begins anew.



***A great spangled** fritillary butterfly (Speyeria cybele) sips nectar from an orange milkweed. Butterflies recognize each other and their food plants by sight, and have color vision.*

***Brilliantly colored** ladybird beetles (Hippodamia convergens) can be discovered in late winter in tremendous swarms. Their bright colors are a warning to potential predators, for their taste is unpleasant.*

With 300,000 known species, beetles outnumber, by far, all other kinds of insects. There are dazzling emerald-green tiger beetles and green caterpillar hunters, with iridescent hues that change with every shift of light. A shiny-black predacious beetle that I often see is *Scaphintus elephus*. It destroys large numbers of harmful insect larvae and also preys on snails and slugs. Ladybird beetles, because they feed almost exclusively on destructive aphids, are among the most useful of insects. Probably no more than one percent of all insects are harmful to man's health, his crops or his domestic animals. All the rest are in some way beneficial as part of a complex ecological web that we are just now beginning to understand.

Of all the earth's creatures, none are more remarkable than the social insects—ants, termites, bees, and wasps. The constitution of each insect society, whether it be an

***Formidable predator** of the garden, the praying mantis waits motionlessly for its prey to blunder near. The serrated edges of the insect's legs enable it to grasp the fly or other prey more securely.*

Bugs In The Backyard

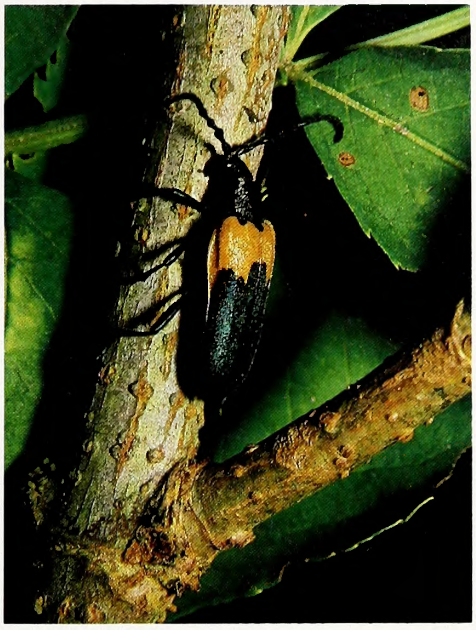
When danger threatens, *these worker carpenter ants rescue the pupae in their colony and carry them to safety. This largest of ant species lives by boring long galleries in rotting logs, but they do not eat the wood.*

anthill, beehive or nest of wasps, revolves largely around the reproductive capacity of a queen and her subjects. In the colony, each individual contributes something for the sake of the whole by carrying out its own predestined unvarying role, always guided by instinct. An anthill or a beehive is not just a milling mass of individual insects, but functionally operates as a single organism—or a single brain—on a hundred thousand legs.

One day just outside my backyard, I discovered an active colony of carpenter ants (*Camponotus pennsylvanicus*) in the base of a decaying stump, and thereafter, spent several afternoons observing and photographing this bustling ant city and its inhabitants. The carpenters, largest of North American ants, carve their galleries and nesting sites in stumps, logs, and dead trees, but unlike termites they do not eat the wood. Though few creatures are more different from ourselves than ants, there are strange and uncanny parallels in the societies of ants and men. Ants have been called the "mankind" of insects because of their complex social organizations, their immense cities, divisions of labor, their wars and slave-making raids, farmers that grow fungus for food, harvesters that collect and store seeds and grain, and herdsmen or dairying ants that keep aphid "cattle" and "milk" them for their honeydew. When danger threatens the colony, worker ants rush in and carry the eggs, larvae, and pupae to places of safety.

Perhaps the most amazing insect that I have encountered is the potter wasp (*Eumenes fraternus*). On a branch or twig, the female shapes and fashions a perfect little half-inch clay jug with a contracting neck and flaring flange. She then lays an egg in it, stocks it with paralyzed, but still-living caterpillars, and seals the neck with fresh clay. Within a few days the young wasp hatches from the egg and begins feeding on the living, but inactive, caterpillars; had she killed them, the newly-hatched wasp would have found a putrid mass of decomposed bodies, worthless for food. In her instinctive behavior, we see powers of perception and foresight suggestive of human intelligence. The workings of instinct remain one of the profound riddles of the universe. Science knows almost more about the stars that wheel in space than of the inborn and unlearned impulsions of instinct in the little potter wasp as she forms her masterpiece of sculpture on a twig.

The brightly colored *painted lady butterfly* (Vanessa cardui) *displays itself on a mountain laurel. Butterflies are among the most colorful of insects, with countless designs among the 300,000 known butterfly species.*



The elderberry longhorn beetle (Desmocerus palliatus) *is one of about 1,200 distinctively marked species of the longhorn beetle family. The larvae of these beetles eat solid tissues of cut logs or dying plants and can be quite destructive.*

As summer passes and the first wisps of color appear on the hardwood ridges, the insect musicians begin tuning their fiddles, an incessant rolling chorus of katydids, crickets and grasshoppers in the backyard trees and tangles of grass. The warmer the night, the merrier seem the songsters, as if trying to drown out the reality that their days are soon coming to an end.

The days grow shorter and the nights cooler, and ladybird beetles gather in clusters around old stumps and other hibernating sites. Among the bumblebees, hornets and wasps, only the mated queens will survive the winter. Monarch butterflies begin to gather for their long migration south, but most of our butterflies and moths will die in the cold, leaving behind, on tree branches and twigs, their cocoons and pupa cases blowing in the rising November winds. Though in a few species of insects, the adults will survive the winter through hibernation or migration, the vast majority, having served nature's purpose, will perish in the killing frosts of autumn. But hidden safely away in crannies and crevices and beneath the ground are the eggs, larvae, and pupae of millions of insects, waiting for spring's clock-of-the-sun. Thus the insects of my backyard, in their own separate ways, bridge the gap between the ordeal of winter's cold and the awakening touch of spring. ⊠

The Art Of Hiding

You might say there's more to camouflage than meets the eye, but knowing how to hide safely can help you bag that whitetail or gobbler.

by Terry Shankle

TERRY SHANKLE

***Even game species** like deer that might not distinguish colors may detect the movement or intensity of highly visible colors like blaze orange; therefore, a camouflage pattern can reduce this reflectivity and help improve success. This wouldn't apply, however, to turkeys, doves and other species which can apparently discern colors. Still, wearing blaze orange to and from the blind is a good idea.*

Camouflage patterns are seen on the streets, in shopping malls, restaurants, schools, country stores, mail order catalogs, and on television. You can get camouflage patterns in just about any piece of clothing from the ground up—boots, pants, shirts, jackets, gloves, hats, handkerchiefs, and yes, even underwear. What makes camouflage clothing so popular? For most, it's a fad sparked by smart advertising, but to people who are involved in various outdoor activities, camouflage clothing has been around a long time. Camouflage clothing, as we know it, was originally developed to give soldiers the ability to hide from their enemies, and naturally, this clothing varies in different parts of the world: white for winter warfare, sand colored for desert fighting, dark brown and green patterns for fighting in forested areas.

The Vietnam War brought camouflage home to us each night on television. Being standard military issue, jungle camouflage was worn by returning veterans and became a major item at military surplus stores. Soon, military camouflage was seen on the streets as well as in the woods and fields. Hunters, photographers, bird watchers, and hikers realized they could use these camouflage patterns to better hide themselves, and get closer to most types of wildlife.

***Wild turkeys have** exceptionally keen eyesight, and total concealment is a must. Most successful turkey hunters camouflage their faces, hands and firearms.*

Deer hunters comprise the largest group of North Carolina sportsmen who use camouflage. During the 1970s and early 1980s, as deer herds across the state have continued to expand, thousands of new hunters have taken up the sport and camouflage clothing is often the next purchase after a license and gun. The swelling ranks of deer hunters also include many first-time archery hunters, and bow-hunters' need to get close enough for a 10- to 20-yard shot places even more emphasis on proper camouflage.

On opening day of the statewide archery season, trees are still in full summer foliage so most hunters choose the popular jungle camouflage. This pattern is made up of dark splotches of green, brown, and black. It offers excellent concealment in the shadows of late summer and early fall, but it was developed for use by ground troops and is most effective when used on the ground in heavy cover. For tree-stand hunting in heavy foliage, the tiger-striped pattern may be better. The colors are similar to jungle camouflage, but the pattern is in vertical streaks rather than in splotches. Wearing it the hunter blends in with both the color of the foliage as well as the mostly vertical design of the bark on trees.

As the leaves begin to fall in late October and early November, our forests change color. The green is replaced by dead-leaf browns and tree-trunk grays. Many hunters, particularly archers, change their camouflage to compensate. The best late-season choice is one that closely resembles the bark of a tree with its vertical patterns of gray, black and brown. In the marshy areas of eastern North Carolina, some deer hunters use a marsh pattern with shades of light brown arranged in a vertical pattern to resemble the marsh grass of the area. This pattern is also popular with waterfowl hunters, and was developed primarily for their use. Some hunters wear white camouflage when early snow coincides with deer seasons in western North Carolina, but this pattern is far less common than others.

Camouflage pants, jackets, and coveralls are the most popular items used by deer hunters, and additional items such as gloves, hats, and boots nearly complete a total camouflage. All that's left is the face and a weapon. Archery hunters particularly use

TERRY SHANKLE

Jungle pattern *camouflage developed in the Vietnam War works best in the early deer season when its splotches of green, black and brown blend into trees still in full foliage.*

grease paints of green, brown and black to darken their face, neck and ears. In areas where mosquitos or biting flies are a problem, a thin mesh camouflage head net works well to afford both camouflage and protection.

Most weapons come from the factory with a bright finish that reflects light. Archers often camouflage their bows with special paint jobs or camouflage tape, and gun hunters subdue the glossy finishes on their weapons using the same materials. Most arrows are also brightly colored so they can be easily found when target shooting, but camouflage aluminum shafts and dark fletchings (feathers) are available and advisable. Tree stands, particularly portable ones made of aluminum, should be painted to cover the bright metal. Splotches of flat brown, black, or green can be applied with a brush or spray paint.

Deer hunters may need and use camouflage, but turkey hunters rely on it even more. The wild turkey's excellent eyesight and ability to distinguish color make total camouflage a must. Even with hands, face, head and weapon camouflaged, turkey hunters say they still spook incoming gobblers. An exposed watchband, even breath on a cold April morning, can alert a sharp-eyed bird.

Although fewer squirrel hunters wear camouflage clothing, it can give you an advantage. The same patterns that work well for deer hunting will help you fill your bag with bushytails.

No camouflage can totally overcome the need at times for a good blind. Blinds are associated with waterfowl hunting, but they can be used to hunt many game species. There are two basic options. The cheapest employs natural materials. Cuttings from evergreens such as pine, cedar, holly, and laurel can be stuck in the ground to provide a very adequate natural blind. Be sure and check with the landowner, though, before building with natural materials. Camouflage fabric attached to trees or shrubs also makes a blind for ground-level hunting. Cotton camouflage materials can be purchased from many catalogs, and camouflage nylon parachute materials can often be found at military surplus stores.

It's important to build any ground blind early enough so that animals can become accustomed to its presence before you hunt. Clean the inside so that your movements don't make noises, and if fabric is used, stretch it tight so that movement in a breeze doesn't scare your quarry.

One element of camouflage often overlooked is smell. You can be visually hidden, and still frighten animals that have a keen sense of smell. Masking your scent is particularly important for deer hunters or those who hunt bear, boar, or bobcat from a stand. Skunk scent may be the only natural odor that will completely cover human scent, but that creates an obvious problem

TERRY SHANKLE

Gray, tiger-striped, *jungle camouflage is favored by bowhunters who seek to match the vertical patterns found in tree trunks. Many hunters maintain several suits of camouflage for different seasons and types of hunting.*

for sportsmen who spend part of their time in the civilized world. The answer for most hunters is to use a scent that covers "most" of the human odor.

Fox urine dabbed on boot soles works well, especially when used in combination with other tactics, such as storing hunting clothing with cedar branches or cedar oil away from the main living area of the home. Here are some tactics that work: Avoid scented aftershaves, shampoos, deoderants, or soaps. Don't eat spicy foods. And don't use strong, smelly solvents on firearms immediately before hunting.

Buck lure scents have been available for years, and their sales have skyrocketed in recent years. Some hunters swear by buck lures while others claim they scare more deer than they attract. Most who use it also add another cover scent. If you've scouted carefully and have a good stand, you should need only to cover your own scent.

There has been much discussion in recent years about whether or not deer can actually see and distinguish colors. Most wildlife biologists agree that although deer lack the necessary cones in their eyes to see colors, they are quite good at distinguishing intensities of light, especially light reflected off bright, solid colors. Blaze orange reflects light well. As a result, it can be seen better by hunters at dawn and twilight. This same reflectivity may alert deer, and studies have shown the new camouflage blaze orange patterns seem to work much better. They are easily seen by humans, but attract less attention from deer because the reflective orange color is broken by the camouflage pattern.

Most hunters exercise great care in positively identifying their target before firing. Still, those who use camouflage should wear some type of bright, highly reflective, blaze-orange hat or vest any time they are on the ground or walking. This is especially true just before dawn and dark when lighting is poor. Photographers and hikers should also exercise this precaution when afield during the hunting seasons.

There is no secret to playing hide and seek with wildlife. All the equipment can be purchased, and if properly used will work well. Preparation is the key, and you can never do too much planning—especially when you take on a critter in his own backyard. ⛝

Archaeologists Find 22 Boats Up to 37 feet Long

Lake Phelps Yields Bonanza In Indian Dugouts

Written and Edited by Mark Taylor

The shores of Lake Phelps must have once resembled the testing grounds for the Old Town Canoe Company judging from the number of Indian dugout canoes that have been discovered there over the past year.

"So far, we've found 22 Indian dugout canoes at Lake Phelps," said Richard Lawrence, an underwater archaeologist with the N.C. Division of Archives and History. "After we raised a 31-footer last April (featured in the Aug. 1986 issue of *Wildlife In North Carolina*), people saw pictures of the boat and began sending in reports. Two fishermen, for example, realized the 'funny log' on the bank which they had fished from for years was a dugout canoe."

Underwater archaeologists Lawrence, Leslie Bright, and Kaea Morris, a graduate student in the maritime history program at East Carolina University, returned to the lake for several weeks last October. All of the boats were located, measured and sketched. Wood samples were also taken. The boats were left in place, but could easily be recovered in the future.

The dugouts ranged in size from 24 to 37 feet, and the average length was about 30 feet. Styles varied. Some had blunt bows and stern, other were pointed, and some had more modern overhanging bows and sterns.

"One of the boats even had the points of the bow and stern facing one side, and the canoe had a slight curve like a banana throughout the length of the hull," said Lawrence. "That really has us baffled. We've never seen anything like it before."

R.G. ABSHER

One of Many: *This 31-foot Indian dugout canoe recovered from Lake Phelps last April by underwater archaeologists Richard Lawrence (left) and Leslie Bright is one of 22 dugouts that have been discovered in the lake over the past year.*

Two of the canoes have been radio-carbon dated, and both are around 3,000 years old. All of the boats are made of cypress, and Lawrence hopes to radio-carbon date the remaining boats and use this information to develop a chronology of their development.

"We also found a lot of pottery and stone artifacts with the boats, which is very unusual," he said. "These range from fragments of a soapstone bowl from the archaic period, which is probably as old or older than the two canoes we dated, to woodland-period pottery which extends through the beginning of European settlement. We assume the boats cover the same time span, although we won't know for sure until the dating is completed."

Archaeologists don't know why so many canoes have been found at Lake Phelps, but there are several possibilities.

"We don't know if the canoes and other artifacts are associated with permanent village sites or seasonal hunting camps," Lawrence said. "However, there's been some speculation that these were seasonal hunting and fishing camps, and the dugouts were scuttled or intentionally sunk when the camps weren't being used. That's a common way to store wooden boats for long periods of time because wood doesn't rot when it is completely submerged, and it would also have protected the boats from theft. The Indians would have retrieved their sunken boats whenever they returned to the camp, and some of these were probably covered with sand and lost."

The boats which have been found at Lake Phelps have also been in unusually good condition. Even the burn and scrape marks from construction of the boats are still visible. Dugouts were built by slowly burning out the interior of a log, and hollowing the insides by scraping out the charred wood with shell and stone tools.

"There's something about the water quality of Lake Phelps that has resulted in excellent preservation," said Lawrence. "The lake is very acidic, and the bacteria and aquatic life which eventually destroy wood seem to be missing. Yet, we placed one of the canoes we recovered in a small pond not more than 100 yards from the lake, and it began deteriorating immediately so we quickly pulled it out."

The canoes which have been discovered in the lake will be left undisturbed for the time being. However, the 31-foot canoe recovered last spring has been preserved, and is now on display at the visitor center of Pettigrew State Park on Lake Phelps.

Field Notes

Wild turkey (bearded birds only)	April 11 through May 9
Trout	Open in all waters, see regulations digest for details

Hunters are reminded that rifles may not be used to hunt wild turkey. This regulation was adopted last year.

Population Still Expanding

Good Turkey Season Predicted

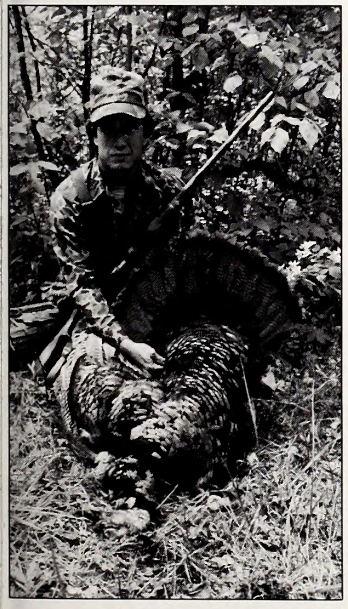
Tar Heel hunters can probably look forward to another record turkey season this spring if the weather is good for hunting. Favorable weather during the spring nesting season, coupled with expanding turkey populations, should add up to good hunting when the season opens on Saturday, April 11. The season will run through May 9.

"We've had warm, dry springs for the past three years which is ideal for survival of young birds," said Grady Barnes, section manager of research and regulations for the Commission's Division of Wildlife Management. "The birds we've released in new habitats have also done well, and the new flocks are expanding."

The Wildlife Commission released 131 wild turkeys last year in restoration areas across the state. Thirty-seven of these birds were received from West Virginia in exchange for 20 Tar Heel otters being used for a restoration project. The West Virginia birds were released in similar habitats in the North Carolina mountains. The remainder of the birds were live-trapped from existing flocks in North Carolina. Restoration areas included sites in Bladen, Craven, and Johnston counties in the east; Montgomery County in the Piedmont; and Cherokee, Jackson, Surry, Watauga and Wilkes counties in the mountains.

"Last year, a total of 538 wild turkeys were reported harvested in 38 of the state's 100 counties," said Barnes. "The top counties were Caswell, Bertie, Ashe, Person, Martin, Onslow, Chatham, Alleghany, Halifax, Macon and McDowell. All of these areas should also offer good hunting this year."

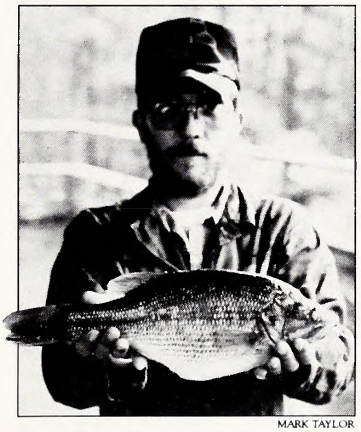
Although wild turkey populations are still expanding in North Carolina, illegal kills remain a problem. Anyone who wishes to report a wildlife violation should contact the Wildlife Commission's toll-free Wildlife Watch Hotline at 1-800-662-7137. All calls will be kept strictly confidential.



Better Than Ever: *Biologists predict a good wild turkey season this spring, and the harvest may exceed last year's record 538 birds. The turkey season opens on April 11 and will run through May 9.*

Fish weighs 3-pounds, 6-ounces

Kerr Scott Yields Record Spotted Bass



MARK TAYLOR

A Proud Moment: *Reginald Ellis of Wilkesboro recently caught this state record spotted bass in Kerr Scott Reservoir. The fish weighed 3 lbs.-6 oz.*

Wildlife Commission fishery biologists have felt for some time that a new state record spotted bass would be caught from Kerr Scott Reservoir, and this occurred on December 10 when Reginald T. Ellis of Wilkesboro caught a 3-pound, 6-ounce fish using a nightcrawler fished on bottom. The old record was a 14.5 ounce spotted bass caught in Lake Hiwassee by Robert Dyer in 1980.

"Spotted bass are native to the Hiwassee River drainage of western North Carolina, and were introduced into Kerr Scott Reservoir from 1977 to 1979," said Joe Mickey, District 7 fishery biologist. "We stocked 13,000 spotted bass fingerlings in the lake over three years to establish the species. The lake offered good habitat, and surveys conducted in 1985 showed that a good population was established and that a record fish was waiting to be caught.

"Spotted bass are similar to largemouth bass, but do not grow as large. In fact, they seldom exceed 5 pounds. However, spotted bass are a fine sport fish and will hit almost any bait or lure used to catch largemouth or smallmouth bass. They seem to be especially fond of small, flashy spinners."

There are several characteristics which may be used to distinguish spotted bass from largemouth or smallmouth bass, and an identification chart is being included in the Wildlife Commission's Hunting, Fishing and Trapping Regulations Digest. Spotted bass have longitudinal rows of small spots on the lower sides of their body forming faint horizontal streaks. The maxillary bone above the mouth (upper jaw) extends to the end, but not past, the rear margin of the eye. The tongue almost always has a small patch of fine, sandpaperlike teeth in its center, and the cheek has three radiating lines of dark green. Also, the gill flap has a dark spot near its margin.

"Anglers who fish Kerr Scott Reservoir should keep a copy of the regulations digest with its identification chart handy," said Mickey. "Who knows, maybe we'll see another state record spotted bass caught there soon."

Given To Commission

Coastal Waterfowl Habitat Saved

The Wildlife Commission recently received a welcome gift from New Bern businessman Danny Strange—nearly 40 acres of wetlands. The tract is located on the Neuse River in Craven County, and offers excellent habitat for wood ducks, mallards and other waterfowl.

"We're losing significant amounts of wetlands all the time," said Earl Gillis of New Bern, the Commission's supervising wildlife biologist for much of coastal North Carolina. "Anytime we can protect wetlands it's good for waterfowl and other wildlife, and we really appreciate this donation."

Deadline To Contribute April 15

Tax Checkoff Supports Nongame

KEN TAYLOR

Teach Your Children Well: *Environmental education programs, such as Project Wild, are one of the areas supported by the North Carolina Nongame and Endangered Wildlife Fund. Others include restoration and management for such endangered and threatened species as bald eagles, peregrine falcons, and loggerhead sea turtles. You may support this fund by contributing through a checkoff on state income tax returns, which are due April 15.*

Book Review

State Of The Ark Thought Provoking

State of the Ark, An Atlas of Conservation In Action by Lee Durrell. Softcover, 215 pp. $14.95. Published by Doubleday and Company, Garden City, New York.

Anyone who is interested in conservation and environmental issues on a global scale will enjoy *State of the Ark*. This book looks at our world region by region, and examines its ecotypes, human needs, land uses, wildlife, and the threats facing its natural resources. In addition, it is beautifully illustrated with artwork and color photographs. Short case studies are also sprinkled liberally throughout the text, and offer insights into specific environmental problems. While some of these feature solutions, many don't.

Teachers may find the book especially useful in a number of subject areas including biology, ecology, geography, and social studies. Sections dealing with the causes and effects of such current problems as the famine in Africa and deforestation in South and Central America are especially relevant.

When Do They Nest?

Reader Enjoys Woodie Article

Dear Wildlife:

I enjoyed Jane Rohling's article on "Condos for Ducks" in the February issue of *Wildlife In North Carolina*. I set out some wood duck boxes around Goldsboro, and have a few questions. When do wood ducks nest in North Carolina, and how long does it take the eggs to hatch? I'd also like to know what time of year is the best time to clean out nest boxes?

—Graham Sasser
Goldsboro

We checked with Grady Barnes, assistant chief of the Commission's Division of Wildlife Management, and he replies that wood ducks in North Carolina generally begin looking for nests in February, and nest in March and April. On the average, it takes about 28 days for the eggs to hatch. An average clutch size is 13 eggs, and usually all of these hatch. Once all the eggs have hatched, the mother leaves the nest box and the ducklings follow.

If a nest box is used, it's best to clean it out immediately after the brood has left and cover the bottom with a layer of fresh shavings. There's a good chance it may be used for a second nesting. Also, late fall or early winter is a good time to clean out all boxes in preparation for the spring nesting season.

Students Sponsor Annual Cleanups

Is Tuckaseigee River Still A Trash Dump?

Dear Wildlife:

Not long ago, I glanced through the July, 1982 issue of *Wildlife In North Carolina* magazine and saw the excellent article on the Tuckaseigee entitled "Rebirth of a River." I thought you might be interested in the continuing story of a group of college students who are working very hard to revitalize this spectacular river. For the past two years, Last Minute Productions of Western Carolina University has sponsored a river cleanup and a 19-mile, Class I-III whitewater canoe race. The first year we had approximately 45 people participate, and last year there were 70 participants.

While it seems that industrial pollution is non-existent in the Tuckaseigee, household garbage is taking over the banks of the river. Many of the local folks still use the river as a garbage disposal. We have tried to inform the public that dumping garbage in the Tuckaseigee is not an appropriate means of trash disposal, but unfortunately littering continues.

We estimate that we have removed a total of nine to 10 tons of trash from the riverbanks in our first two cleanups, and hope to remove much more this spring. Our third annual Cullowhee Water Safari and River Cleanup will be held on April 11-12. On Saturday morning, participants will meet at 11 a.m. at the University Center on the Western Carolina University campus to organize the river cleanup. A free barbecue will be held that evening for all volunteers. On Sunday, the canoe race will take place. Registration is at 8 a.m. and the race will begin at 9 a.m. The race is open to men and women in solo and tandem events, and more information may be obtained from the Western Carolina University Student Center, Outdoor Programs, Box 1989, Cullowhee, N.C. 28723 or call 704-227-7479.

—Dirk Van Helder
Outdoors Programming Asst.
WCU, Cullowhee

A Fight To Remember

Big Fish Provides An Epic Adventure

Everyone enjoys a good fish story. This one recently appeared in a newsletter published by Atlantic Marine of Bradley Creek in Wrightsville Beach. We'll let you be the judge of its authenticity.

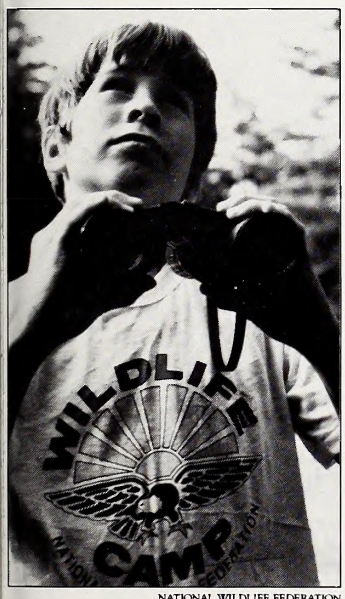
"Four days and five nights I fought that fish. It pulled my 18-footer clean up the coast to Hatteras, then turned and proceeded to tow my boat due south all the way to Carolina Beach.

"On the fourth day of my adventure I finally caught my first glimpse of the fish. He or she (I couldn't tell from such a distance) jumped a good 30 feet into the air, jerking me out of the boat. The next thing I knew I was skiing barefoot behind him at speeds in excess of 70 miles per hour. As I was screaming at the top of my lungs I happened to open my eyes just in time to see my fish swim onto shore and jump into a life guard's 4-wheeler. Before I knew it my fish hit the gas full throttle, dragging me behind.

"Through the sand being thrown in my face I could see the fish look left, then right. I knew then that my fish was no ordinary fish. All of a sudden he slammed on the brakes and I came somersaulting up to him only to find him sitting with five other fish playing poker.

"Then I realized the truth. I don't care if you believe me or not, because I know that I had just caught my first card shark!"

Federation Offers Wildlife Camps



NATIONAL WILDLIFE FEDERATION

A Learning Experience: *The National Wildlife Federation will hold its Eastern Wildlife Camps at the Kanuga Conference Center near Hendersonville this summer. These camps combine nature study and outdoor recreation. Programs are available for youths from age 9 through 17. The special teen programs also stress leadership. For more information, write Youth Programs, National Wildlife Federation, 1412 16th St., N.W., Washington, D.C. 20036.*

Wild Turkey Can Be Tasty

You'll Gobble These Recipes

April means wild turkeys to Tar Heel hunters, and the woods will soon be alive with yelps and clucks designed to make normally wary Toms lose their heads over romance. These birds are trophies for the table as well as in the woods. Here are two simple recipes for wild turkey. One was contributed by Steve Juhan of Mt. Gilead, a Commission wildlife management technician. The other is from Brian Hyder of Otto, former Commission wild turkey project leader who is now southeastern director of the National Wild Turkey Federation.

Wild Turkey Roast

Clean turkey (pick or skin). Wash and dry turkey. Rub with butter or salt inside. Stuff body cavity with:

1 onion
1 apple
1 orange
1 potato
2-3 stalks celery

Place in pan breast down with one inch of water. Cover with foil tent. Cook in oven at 250 degrees for two to four hours depending on size of turkey. Baste often with pan drippings. Don't overcook.

—Steve Juhan

Wild Turkey Roll In Sauce

8 (six-ounce) pieces of wild turkey breast (boned and skinned)
8 slices bacon
3 oz. package pressed beef
½ pint sour cream
1 can cream of mushroom soup

Roll bacon slice around each piece of turkey breast. Lay breast on 2 slices of beef. Bring edges of beef around breast meat. Hold together with toothpick. Place pieces in greased 9x13 inch pan. Mix sour cream and soup and pour over turkey rolls. Bake at 275 degrees for two hours uncovered. Serve with wild rice.

—Brian Hyder

The Wildlife Endowment Fund Report

The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife In North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Status on January 31, 1987

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	24,545	$7,244,804.34
Lifetime Hunting License	164	33,186.79
Lifetime Fishing License	1,488	270,145.98
Lifetime Subscriptions to Wildlife in N.C.	934	115,137.59
Contributions	—	82,933.64
Fund Total		$7,746,208.34
Total Interest Earned	$1,465,700.46	

Calendar Of Events

April 1-5
Grifton Shad Festival in Grifton. Features shad fishing contests, canoe race and other events.

April 3-5
Southern Sports and Outdoor Show at the State Fairgrounds in Raleigh. Exhibits and demonstrations of hunting, fishing, and other outdoor equipment.

April 10-12
North Carolina Wild Foods Weekend at the Betsy Jeff Penn 4-H Center in Reidsville. Learn how to identify, collect and prepare wild foods. For more information, contact Kenneth Perkins, P.O. Box 396, Elon College, N.C. 27244.

April 11
Spring Wild Food Day at the North Carolina Aquarium at Fort Fisher in Kure Beach. For more information contact Bill Martin, Education Coordinator, P.O. Box 130, Kure Beach, N.C. 28449.

May 1-3
Outdoor Bowhunters Shoot sponsored by the Mecklenburg Bowhunters at the Mecklenburg Wildlife Club in Charlotte. Competitors will shoot at three-dimensional targets at unmarked distances. For more information contact Bob Henry, Mecklenburg Bowhunters, 3417 Sandy Porter Rd., Charlotte, N.C. 28217.

Imposes Self-Inflicted Fine

Fisherman Makes Wrong "Snap" Decision

Veteran wildlife enforcement officers Mike Johnson and Ernie Stiles of Jackson County are probably still chuckling at a sight they encountered one day last fall. The officers were driving along a road bordering a mountain stream when they saw a fisherman scrambling up the bank. The angler pulled himself up to his full height, defiantly set his jaw, and proceeded to methodically snap his fishing rod into five pieces.

The officers were dumbfounded. "Why'd you do that," they asked after they had pulled over.

The man stuck out his chin and looked the officers straight in the eye. "You may get me," he said, "but I'll be darned if you'll get my rod."

At first the officers didn't understand, but then smiles spread across their faces. The man thought he'd been breaking the law, and had broken his rod to prevent the officers from confiscating it. It was all they could do to keep from laughing as they handed the five pieces back to him.

"You don't need a fishing license for this creek," they said. "It's inside a national park."

The man didn't say a word as the officers politely walked back to their vehicle. As they drove off he was still standing in the road, staring at the broken sticks that had once been his fishing rod.

"The incident has two morals, the officers said later. "Obey the regulations to begin with, and know those that apply to where you're fishing."

—*Jay Davies*

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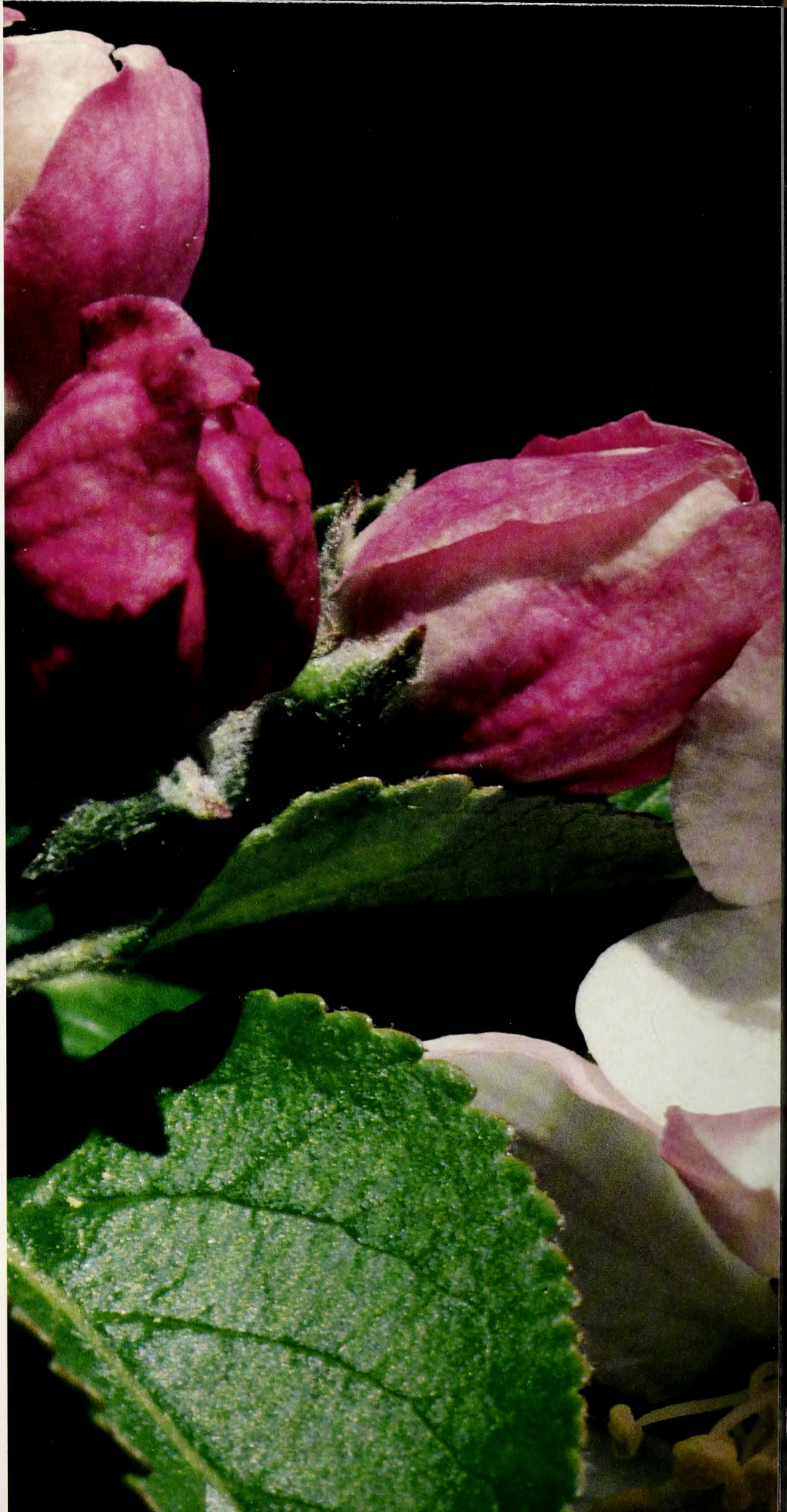

Pollen Pushers

Two honeybees ladened with pollen visit a blossom on their nectar-gathering rounds and help propagate many flowering plants.

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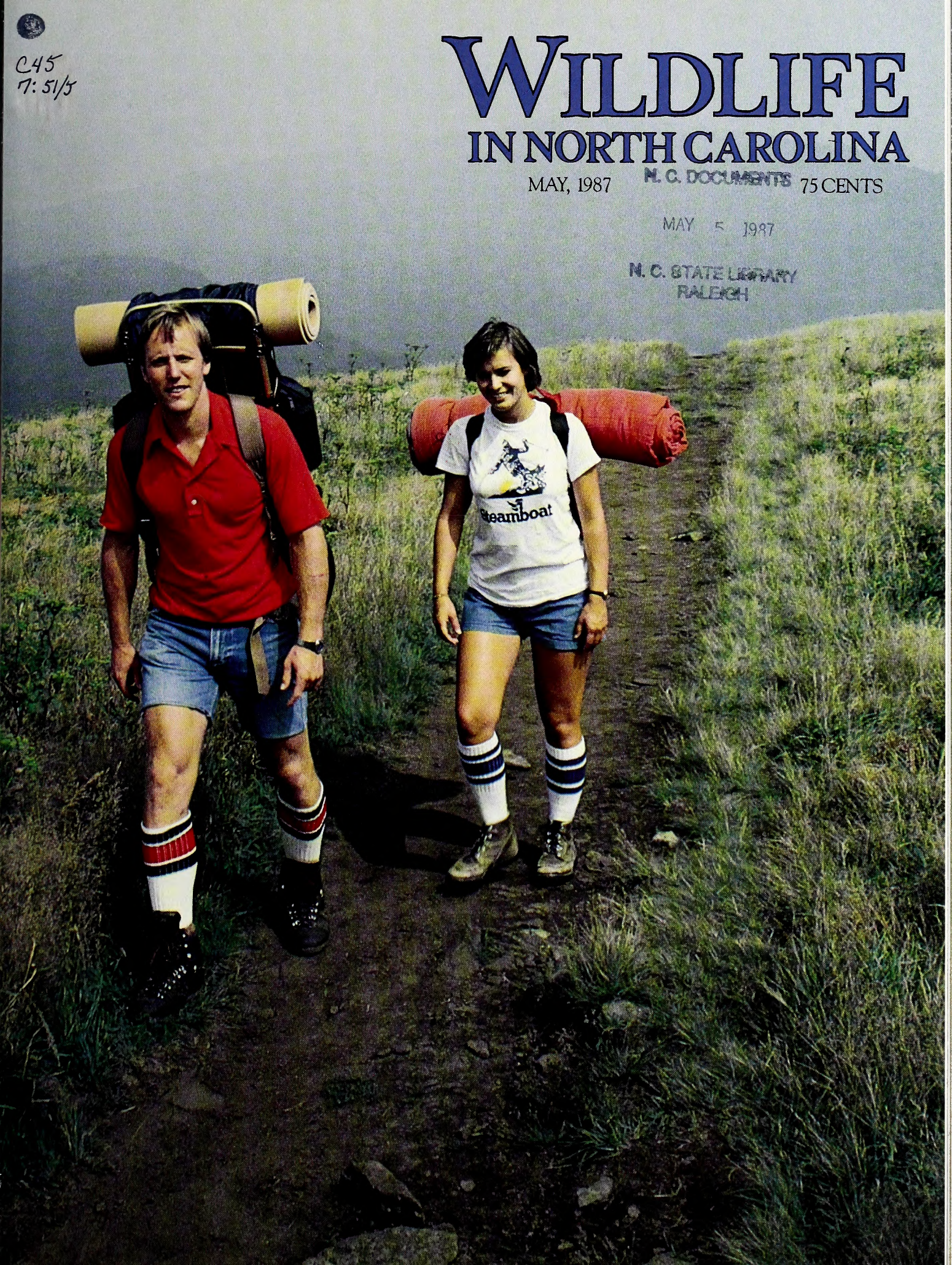

Fishing Television's Fertile Waters

by Jim Dean

Here we are in the land of the midnight sun hauling 'em in right and left. We're not exactly sure what it is we're catching, but we've read about them. (Well, to be honest, we haven't been doing much reading here of late). But danged if we aren't puttting a hurtin' on 'em, me and my buddy Orlando. Or is it Roland, Bill or Jerry? Never mind, who cares, pass the chips. Hey Alex, if you're headed for the kitchen, fetch me a brew.

Boy, this is another great day for fishing. We've just finished slaying the char here in the Arctic Circle, and just a few minutes ago we were sticking it to a bunch of largemouth bass in Texas. We've caught bonefish in Belize, crappies in Santee, Atlantic salmon in Scotland and cutthroats in Montana. It don't get no better than this.

Welcome to the era of the armchair angler, king of the couch potatoes. It seems like only yesterday that we were chiding former athletes for spending all their time vicariously reliving their past by watching televised sports. Learn to fish, we said. Get out there and participate. Don't grow fat and lazy lying there on the sofa. Oh boy, have we ever had to eat some crow—not to mention all those TV snacks.

Right now, we're fixing to go smallmouth bass fishing somewhere in Canada. Say, doesn't one of our companions look kind of familiar? Gee, he looks so laid back I hardly recognized him.

"You know what's a fact, I'd rather fish any day than coach basketball," remarks the head coach of the Hoosiers as he unhooks a fat smallmouth. Atta boy, Bobby. You got that right. Slide that popcorn over here, wouldja?

Fishing with Bobby turns out to be one of the highlights of the trip. Some of the celebrity guests we've fished with don't know their ferrule from their fighting butt, but that's not the case with Knight. He knows what he's doing. Shucks, we might even pull for him if he's not playing an ACC team.

You know what the best part is? We haven't been gnawed on by a single mosquito or black fly. No ticks, no sunburn, no leaky waders or rain jackets. No fish to clean, no credit companies hounding us for bass boat payments. We've got it all, and it's right here on the sofa where we've been lying more or less permanently since Christmas, a Twinkie in one hand and a remote control in the other. It's comfortable, too. It's cold out there on that lake in the winter. Besides, nothing is going to be biting in this weather. Hit that remote, and let's go tarpon fishing in the Keys.

Who would ever have believed that a sport like fishing would become so popular on television? Of course, it is convenient. No need to pack up the gear, load the boat or drive anywhere. No crickets or minnows to buy. No getting up at the crack of dawn.

As you might have guessed, this was written months before publication while most of us were sliding back and forth to work on icy streets. Now that the peak of the real fishing season has been ushered in by the balmy days of May, most of us have finally managed to peel ourselves off the sofa and rejoin the living.

Still, it may be worthwhile to evaluate this fairly recent TV fishing phenomenon. Although there have been a few hunting and fishing shows on television for years, new ones seem to be cropping up every season.

It would be easy to criticize many of these shows as amateurish, and they may also raise false expectations among novices. After all, these guys always seem to catch fish. But so what? I probably wouldn't watch if they weren't catching fish—I have enough fishless days on my own.

On the plus side, I can think of several good reasons to watch TV fishing shows. For one thing, I've gotten a firsthand look at some places I'll never get to see in real life. Furthermore, if you're planning a trip out west to fish for trout, or heading for Florida to try for tarpon, you can get a better idea what to expect. That's obviously useful information.

Even if all your fishing is local, you can pick up useful tips. Take bass fishing, for example. A few years ago magazines were full of articles about a relatively new technique called "flipping," but it was difficult to get any real idea how to go about it. I happened to watch a fishing show one afternoon, and the technique was immediately clear.

I have only one real criticism. Most of these shows are aired smack in the middle of prime fishing time. On second thought, maybe we ought to be thankful so many of them are scheduled during weekend afternoons. If enough fishermen are home watching them, they're not cutting in front of us and ruining our fishing.

Stay tuned, folks. And Alex, keep those chips and brews coming. The tab's on me.

May, 1987
Volume 51, Number 5

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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DEPARTMENTS

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Nature's Ways *by Lawrence S. Earley*

Back Of The Book *by Mark Taylor*

Cover *Hikers near the crest of one of western North Carolina's mountain balds along the Appalachian Trail in this photo taken by Chip Henderson for the Department of Travel and Tourism.*

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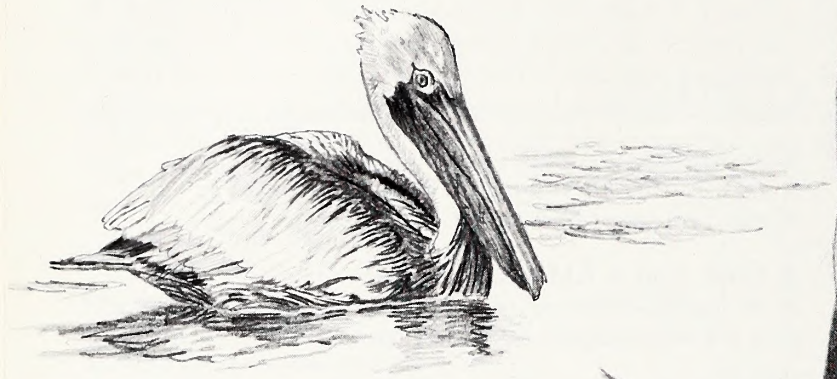
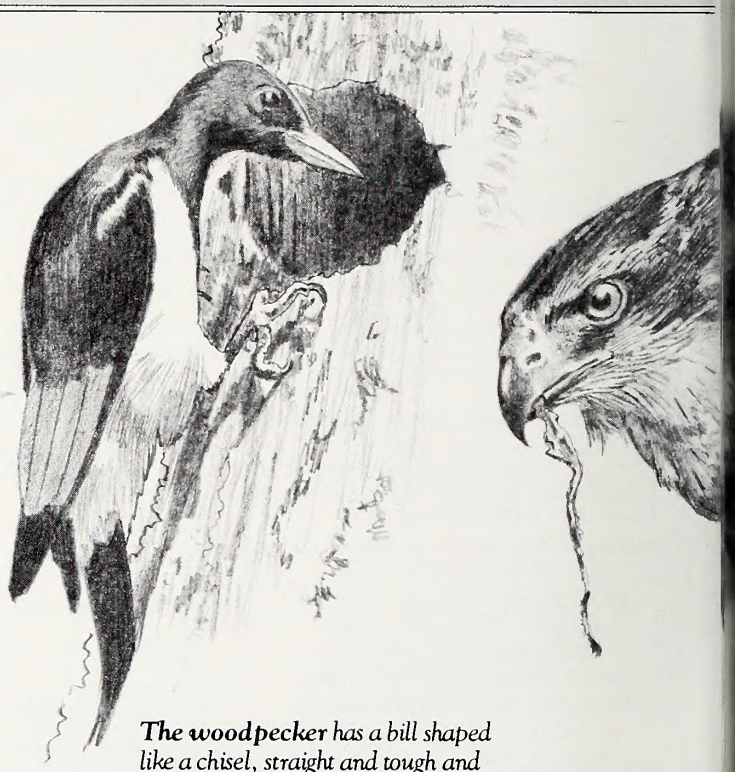
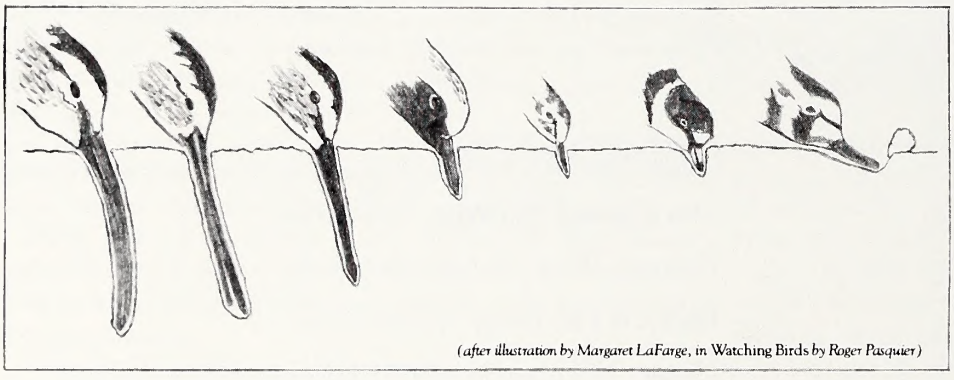
The pelican *has a quite specialized bill, a pouch that opens voluminously under water to scoop up fish like a net. After draining the water from its pouch the pelican then swallows the fish.*





A seed-eater *like the cardinal has a short, thick bill that can break the tough outer covering of hard seeds. To do this it possesses strong adductor muscles, muscles that pull the jaw closed. Birds that probe deep into the soil with pointed bills, such as shore birds, have stronger protractor muscles, ones that can open the jaw against a resistance.*

The woodpecker *has a bill shaped like a chisel, straight and tough and suited for excavating cavities in wood or breaking the outer shells of nuts.*



(after illustration by Margaret LaFarge, in Watching Birds *by Roger Pasquier)*

Mud banks *are often crowded with many kinds of shorebirds feeding at the same time, but they don't compete with each other. Each species has a slightly different bill shape that enables the bird to take different foods. Left to right, the whimbrel, Hudsonian godwit, short-billed dowitcher, black-bellied plover, least sandpiper, semipalmated plover, and ruddy turnstone.*

The Useful Shapes Of Bird Bills

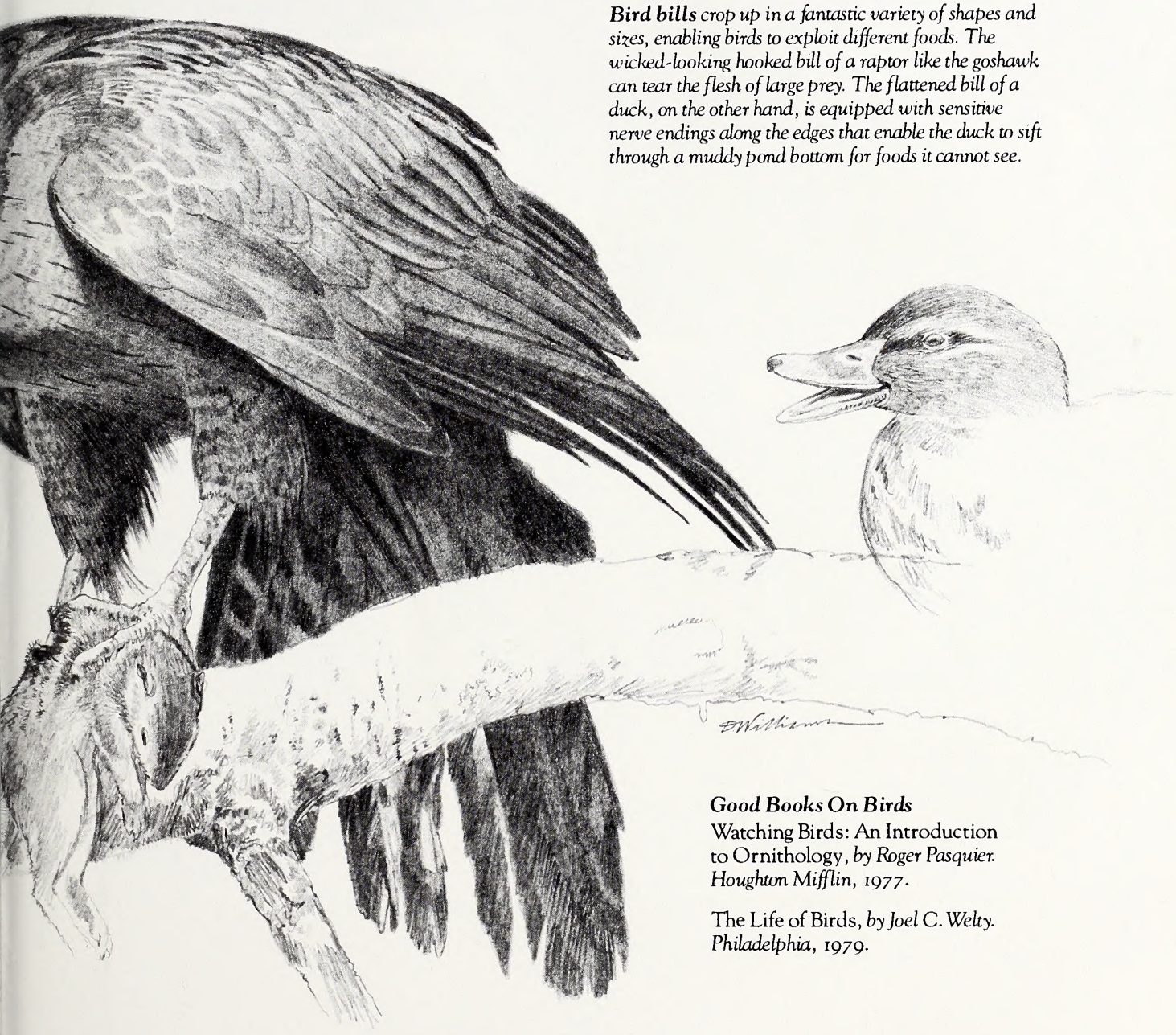
written by Lawrence S. Earley/illustrated by David Williams

Birds are feathered bipeds with wings. This may be adequate as a zoological definition of a bird, but as a description it leaves out so much. In fact, it leaves out the individual bird. Looking at any habitat, from a salt marsh to a backyard feeder, one is less aware of the features that birds share than of the fantastic differences among them.

Take the assortment of bills on birds. Even within our own state, there are enough shapes and sizes to defy the listmaker. They include the pelican's capacious pouch, a woodcock's slender prober, a cardinal's thick mandibles and the hooked bill of a hawk. There are dozens more. Studying the differences among them is a good way to understand how a bird makes a living in its habitat.

In all cases, a bird's bill is merely hard skin, consisting of the same epidermal cells as feathers and claws. The bill's purpose is to "expose, seize, kill and prepare food for swallowing," as ornithologist Joel C. Welty says in *The Life of Birds*. Indeed, it is impossible to think of a particular kind of bill without also thinking of the food that the bird eats.

Among songbirds, for example, Roger Pasquier distinguishes four bill types tied to different diets. Seed eaters such as grosbeaks and finches have short, thick bills appropriate for



Bird bills *crop up in a fantastic variety of shapes and sizes, enabling birds to exploit different foods. The wicked-looking hooked bill of a raptor like the goshawk can tear the flesh of large prey. The flattened bill of a duck, on the other hand, is equipped with sensitive nerve endings along the edges that enable the duck to sift through a muddy pond bottom for foods it cannot see.*

Good Books On Birds

Watching Birds: An Introduction to Ornithology, *by Roger Pasquier. Houghton Mifflin, 1977.*

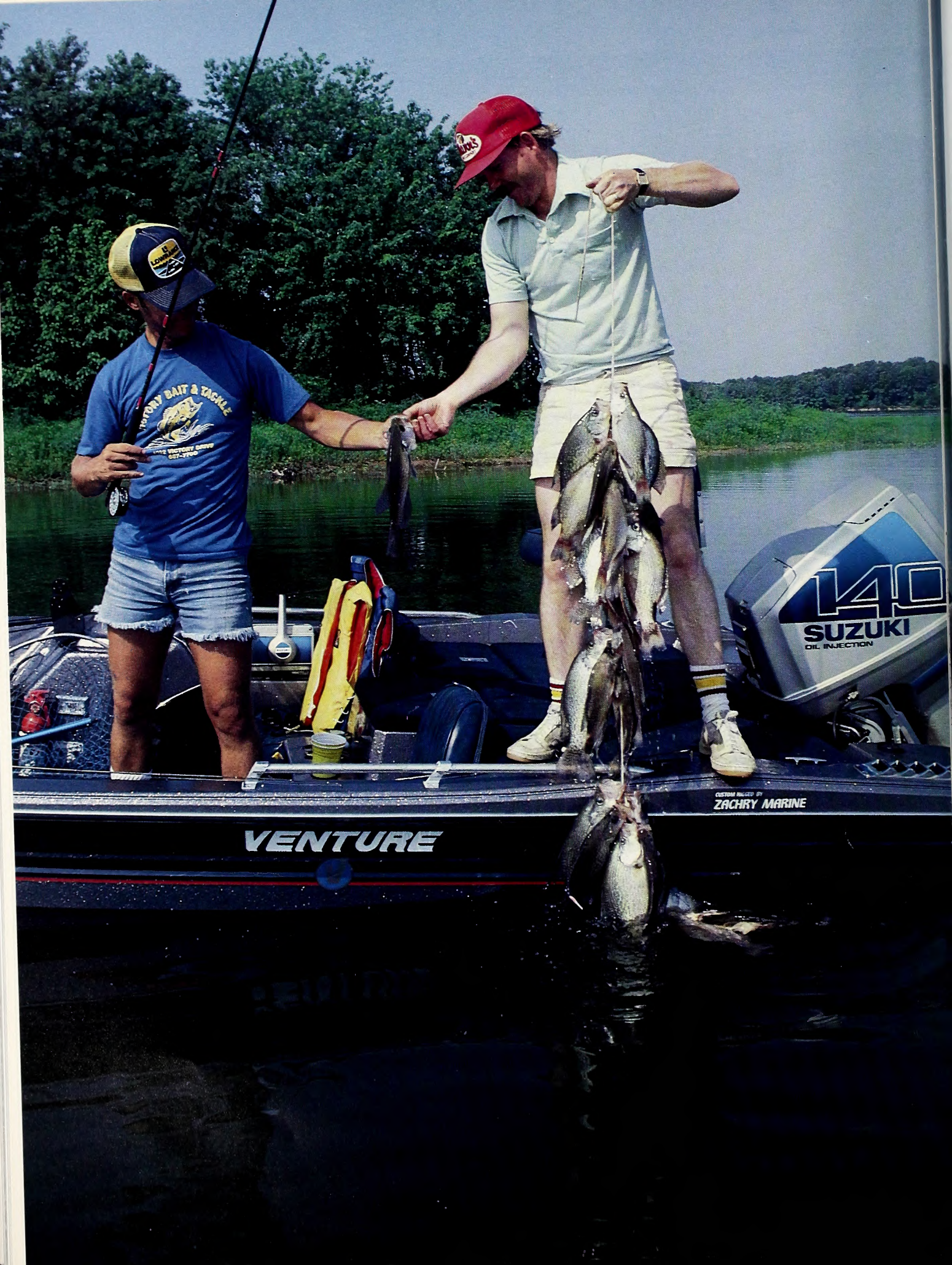
The Life of Birds, *by Joel C. Welty. Philadelphia, 1979.*

crunching a tough seed. Birds that hunt among foliage for insects have long, thin bills. Starlings and other birds that probe the ground for insects have pointed bills. And those that catch insects on the wing have wide bills.

A bill shape that is appropriate for one bird would be catastrophic for another. An ibis would get nowhere searching for fish with its thin, decurved bill, but its shape is perfect for penetrating the recesses of a fiddler crab's burrow. A snowy egret would die before it could take a diet of flying insects with its long and pointed bill, but that shape is quite adequate for snatching and sometimes stabbing fish in low water.

Looking at the variety of bill shapes can help us understand how animals can dwell in the same habitat and not compete with each other for food. On a mud flat along the shore, for example, tribes of shorebirds feed at the same time, yet they co-exist peacefully because each is taking different foods or similar foods from different levels (see boxed illustration). In effect each occupies a different ecological "niche." Habitat is where an animal lives and gets its food, water and shelter. The niche, which includes the kind of food it takes, its activities and behavior, is how the animal makes a living in a habitat dense with many other animals.

The particular shape of a bird's bill helps it take a discrete niche in the habitat, enabling it to live peacefully with its neighbors and survive in a crowded world.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YEAR-ROUND CRAPPIES

Spring may be the best time to catch crappies, but you can get "slabs" all year if you know how and where.

written and photographed by Pete Elkins

North Carolina is blessed with good crappie fishing, and it may rival that found anywhere in the Southeast. Both white and black crappies thrive in the Catawba River, Yadkin and Pee Dee impoundments. Kerr and Gaston reservoirs along the Virginia border are on a par with much more publicized lakes like Santee-Cooper. Furthermore, many city reservoirs also offer excellent crappie fisheries, and crappies are abundant in many Coastal Plain lakes and rivers.

This abundance is enhanced by the fact that most of North Carolina's better crappie waters are fishable thoroughout the year. Only abnormally muddy conditions or rare frozen surfaces temporarily inhibit crappie activity, although some fishermen may be reluctant to brave the elements.

Throughout the year, many crappie anglers limit themselves to a single angling method: cane poles and live minnows. Of course, both skilled and beginning anglers find the ubiquitous minnow universally effective for the papermouth clan, but there are other methods which work very well, and may offer more sport. Used properly, they may even outfish minnows. These include trolling, vertical jigging, and casting, but the nuances are many.

Trolling isn't a very popular crappie technique in North Carolina, but it is amazingly effective once mastered. While trolling can be productive during the peak spawning months each spring, it is at its best before and after the spawn.

***Color is a poor way** to distinguish white crappies from black crappies. The white crappie has five or six dorsal spines, while the black crappie has seven or eight. This fish is a white crappie.*

During the so-called "pre-spawn" period—roughly from late February through March—crappies tend to concentrate in large schools in deep water near shallow spawning areas. These concentrations are often immense and contain very large egg-heavy females. Favorite areas include the mouth of a creek or entrance to a cove. Areas of standing timber are also good if the water is 10 feet deep or more, as is deep water adjacent to creek channel ledges where there is a relatively abrupt depth change, and some bottom cover such as brush or stumps is also a likely spot.

Even when water temperatures nudge into the spawning range of 62° to 68°F, larger

***This fine string of crappies** was caught after the spawning season by bumping tiny jigs along shallow creek channel ledges using a modified flyrod.*

"Normally, crappies will hook themselves. Experienced trollers advise not to touch a rod until it is bending under the weight of a fish."

***A small minnow** is still the favorite natural bait for crappies, but there are several effective techniques using artificial lures that may sometimes outfish minnows.*

female crappies still tend to remain schooled in deeper water out from the spawning site itself. The more aggressive males will be in shallower spawning habitat, and may account for most of the bobber and minnow springtime catch. When all conditions are right, the female will move into shallow cover to deposit her eggs. But her stay is brief compared to the male crappie, and she quickly returns to adjacent deeper water.

Consequently, trolling can yield more true, "slab" crappies. Crappie trolling sounds simple, and it is, once certain fundamentals are observed. The key is determining how deep the crappies are, and presenting a slowly moving lure at that exact depth.

Precise depth control becomes even more important after the spawn during the summer and winter months when crappies tend to suspend at mid-depth over much deeper water. Modern electronic fishing aids make locating crappies a relatively easy task. While flashers or the newer liquid crystal depth-finders will do the job, a good chart recorder is an invaluable crappie fishing tool during prespawn, summer, and winter periods. As a very rough rule of thumb, expect to find schooled crappies at approximately 10 to 15 feet during the summer months, 6 to 8 feet during the fall, and from 10 to 12 feet during the winter so long as surface water temperature remains about 46°. Once winter surface water in North Carolina drops much below 46°, expect to find crappies hugging the bottom in shallow lakes, and as deep as 30 feet in larger lakes.

After determining the depth and location of a crappie school, presenting a trolled lure in front of the fish isn't difficult with a little practice. There are many excellent crappie lures adaptable to trolling. The most effective include small 1½- to 2-inch curly-tailed plastic grubs. I also personally like a plastic-bodied lure called a "Hal Fly." In other parts of the South, where trolling is the most popular crappie method, Hal Flies are the standard.

Experienced trollers stock Hal Flies and jigheads for plastic grubs in 1/16th- to 1/12th-ounce sizes and in a wide variety of colors. Some argue that it's the fisherman who is color conscious and not the fish, but my experience indicates that crappies are at least as sensitive to lure color as any freshwater fish found in the state.

A pair of skilled crappie anglers will usually troll from four to eight or more rods at once. Light spinning tackle with 6-pound mono is fairly standard for trolling. In ultra-clear water, or when crappies are holding below 10 feet, 4-pound line may be a better choice.

The trolling drill goes something like this. Trolling speed is maintained by electric motors, and Hal Flies or jigs should be cast about 30 feet behind the boat. Rods should be arranged on the deck or placed in rod holders so that their tips are no more than a foot or two above the water.

Slow is the best trolling speed. If slow doesn't work, go even slower. A slowly trolled 1/16-ounce Hal Fly on 6-pound mono will run about 6 to 8 feet deep. Lure running depth can be adjusted infinitely by combinations of boat speed and line length to place the lure at the crappie's exact level.

Normally, crappies will hook themselves. Experienced trollers advise not to touch a rod until it is bending under the weight of a fish. When trolling through a large concentration of prespawn or summer/winter crappies, it's not unusual to hook a fish on almost every rod—at which point it's fire-drill time.

There are a few other generally valid observations about crappie trolling. For me, the best results occur when the boat is moving with, rather than against the wind. Since crappies school in a horizontal plane, expect to find most fish in one area at the same depth. Crappies will rise a foot or so to take a lure, but are generally reluctant to strike a lure moving below them.

After a little experience, trolling is the easiest and most consistent way to catch large numbers of crappie throughout the year. But it's not the only way. How you choose to fish is highly subjective. For example, trolling isn't particularly exciting to me, even though I know it's very effective.

If conditions permit, I will always reach for a modified fly rod, and jig vertically for crappies. Vertical jigging is just a fancy way of saying that a lure is presented in an up-and-down fashion, hopefully in front of a fish's nose. There are a lot of local names for the method: "flipping" and "dipping" being two I've heard. Whatever the name, the method is a lot of fun and very productive throughout the year.

Crappies are highly vulnerable to a stationary or slowly falling lure. Trollers capitalize on this by frequently stopping the

***The author** uses a modified flyrod with large ceramic guides to jig for crappie. The larger guides permit light lines to slip through easily even with the tiniest jigs, and the extra length is also very useful.*

Ranger
UNCLE JOSH
BAIT COMPANY

"If conditions permit, I will always reach for a modified fly rod, and jig vertically for crappies. At times, verticle jigging will catch more fish than any other method."

boat to let the trolled lure fall briefly. Vertical jigging is based purely upon a crappie's preference for an almost motionless or slowly sinking lure. Almost any tackle can be used, but a longer rod permits an angler to drop a lure a bit farther from the boat, and that's an advantage when crappies aren't spawning and tend to be a bit spooky. A long fly rod is ideal. Experienced vertical jiggers lean toward 8½- to 9-foot graphite blanks with conventional "snake" guides replaced by size 8 aluminum oxide guides. This modification of the guides minimizes wet monofilament's tendency to stick to the rod blank. When using 1/32-ounce jigs, it's critical that the lure drop easily and freely from the tip when released, especially while jigging heavy cover where the rod tip is often "poked" into opening in the cover, and the lure then dropped straight down from the tip.

Some crappie jiggers like to use spinning reels on the modified fly rod. Others prefer single action fly reels. I lean toward a fly reel because of its almost worry-free operation. Unlike a spinning reel, no line loops or unwanted tangles ever develop. The key to successful jigging is total concentration on the line and lure in anticipation of often subtle strikes, and you don't want to be distracted by malfunctioning gear.

Good fly rod jiggers concentrate on conventional shoreline cover during the spawning months. When crappies are engaged in the spring rites, almost any method will catch them, but fly rod jigging will probably catch more than any other method in an equal amount of time. The reasons are pretty obvious: the fish are shallow and aggressive, yet no time is lost while you rebait or untangle lines. After the spawn when water temperatures rise into the 70s, a fly rod jigger can still catch a lot of hefty crappies. But you'll need to shift to targets more than 10 feet deep. Deep standing timber, bridge pilings or submerged cover along ledges or channels, and some boat docks will be good spots.

Fly-rod jigging is at its most efficient when fishing no deeper than the length of the rod. Again, the reason is a mechanical one. When the lure snags in cover, as it inevitably will at some point, it's simple to gently snug the rod tip against the lure and free it with a quick push. It works every time, but only if the lure is within reach of the rod tip.

Despite losing this advantage, deeper jigging, at 15 to 20 feet is still highly effective. Some of the largest white and black crappies I've seen have inhaled 1/32-ounce "mini-jigs" being gently bumped through bottom cover in 20-foot depths with a fly rod.

Fly rods and 1/32-ounce mini-jigs are best matched with 6-pound mono, though 4-pound test may increase the number of strikes in clear water. Under murky conditions when crappies are less than 4 feet below the surface, 8- to 12-pound test may be in order, especially if the fish are in thick cover.

Choosing the right line size is a compromise between the propensity of lighter line to draw more strikes and heavier line to minimize lost fish. The possibility of hooking a largemouth bass also complicates the issue. Largemouth are frequent party crashers when an angler jigs vertically, and can wreak havoc on 4-pound mono in thick cover.

Jigging, like trolling, is basically uncomplicated. Lower the jig slowly to the desired depth; hold it as still as possible; then, if no strike occurs, gently shake the rod tip or raise the jig 6 inches or so and let it slowly drop back down.

Don't forget to fish all sides of shallow cover. Crappies, like largemouths, often have a distinctive "pattern" preference. When fishing shallow docks in mid- or late April, the fish may be around only docks with wooden pilings, rather than Styrofoam or barrel flotation. They may be in the shade of such cover, or even on the sunny side, during early March. The key is to watch for any developing preference, then concentrate your efforts on similar spots.

Although it's most efficient during the spawning period, fly rod jigging has its moments at other times of the year. Fallen treetops with their crowns deeper than 10 feet can hold crappies all summer long, and few methods can match a fly rod in the treetop arena. As long as the jig is presented straight up and down, hangups are less frequent.

During the winter months, crappies frequently concentrate around deep boat docks or other wooden cover. Under normal winter conditions, expect to find crappies between 7 and 13 feet deep. A fly rod and mini-jig combo is very effective for these cold-weather fish.

Deep docks are also good places to hone your crappie-casting skills. For sheer fun, casting tiny jigs is hard to top. At the same time, under specific season and water conditions, casting is also the best way to catch large crappie. Suspended crappies, once located, can be caught by casting 1/24- to 1/8-ounce jigs using a "count-down" method to ensure depth control.

During the spawning season and during the early part of the summer, some exciting crappie fishing is available around boat docks for anglers who have mastered an old casting technique called the "bow and arrow" cast. Grasp the jig by the hook bend with about 3 feet of line between lure and rod dip; open the spinning reel bail, holding the line with your forefinger, and bend the rod by pulling with the jig hand. Aim in the right direction, release the jig, it will shoot low across the water to the target.

With some practice, this method permits an angler to place a jig far back under docks and piers even though the bottom of the dock may be only inches above the water. Mastering this technique can introduce you to crappies that see few lures.

Another deadly casting method involves fishing deep submerged treetops with their crowns 15 to 25 feet below the surface. Expect to lose some jigs, but anticipate some hefty crappie from early summer through early fall. Experienced crappie anglers stealthily anchor both ends of their boat within easy casting distance of the submerged cover. Doing so creates a stationary casting platform, which makes detecting very subtle strikes much easier.

After positioning the boat, cast to the treetop, count the jig down using a "one thousand-two thousand..." cadence until the falling jig draws a strike or makes contact with the submerged treetop, and then make subsequent casts to the same depth count (if a crappie struck) or one count less to keep the jig just above the cover.

Ultra-light spinning tackle with 4-pound mono is the best combination. The lighter the jig, the more effective it is to crappie, and I usually start with a 1/24-ounce green and white chenille jig. It's important to retrieve as slowly and steadily as possible. Strikes will be nothing more than a minute twitch of the line or even an instant's loss of "feel" with the jig.

It's not unusual to fish a dozen or so deep treetops with little results, then find that the next submerged treetop is hosting a crappie convention.

Casting, vertical jigging, and trolling are three crappie techniques that add versatility to a crappie angler's tactics inventory, and one of these tactics will produce crappie whenever you're ready to go. ⊠

KEN TAYLOR

***Youngsters who learn to fish** often develop a lifetime hobby.*

A Kid & A Cork

As the Wildlife Commission's CATCH program enters its second year, more and more youngsters are learning how to fish.

by Kim Garner

Kevin's red and white bobber was motionless on the still lake. He had been staring at it for what seemed an eternity, and the hot summer sun sent a rivulet of sweat down his forehead. He wiped it away quickly, never taking his eyes off the bobber.

Was it his imagination, or had the bobber actually moved? Before he had time to think, it became a red and white blur disappearing beneath the surface. Kevin jerked his rod to set the hook, but his line went slack and he began to wonder if there had ever been a fish on his hook.

"Wind it in! Wind it in!" Kevin heard someone behind him yell.

JOE MICKEY

***Members of CATCH** proudly display the fish they caught at this clinic in Ashe County near West Jefferson. Adult volunteers help make these clinics a success.*

Of course! In all the excitement, he had forgotten the most important part. Kevin began turning the reel handle and the line quickly tightened. He could feel the fish at the other end.

"Keep the rod tip up," came the voice from behind him. Kevin responded and reeled even harder. Slowly but surely the fish neared the bank. There it was! What had felt to Kevin like Moby Dick was actually a 12-inch channel catfish. Not a bad catch for his first fish.

With the help of the adult volunteer who'd been advising him, Kevin managed to take his fish off the hook and put it on his stringer.

After rebaiting and throwing his line back out Kevin couldn't resist the urge to look at his fish. Several times, he lifted it out of the water to admire it. Another life-long convert!

Kevin's first fishing experience took place during one of the CATCH (Carolina Anglers Teach Children How) youth fishing clinics. He is one of over 2,000 youths who have participated in the youth fishing program sponsored by the N.C. Wildlife Resources Commission since it began last year.

The program is designed to instruct youths of ages eight to 15 in the skills, pleasures and places of fishing while instilling good outdoor ethics and sportsmanship.

Many youths today don't learn to fish any more. There are many reasons, including competition from other activities such as school sports, computers, video games and television. Some children who participate in the CATCH program are from single-parent families and often aren't exposed to the sport of fishing while growing up. The Wildlife Commission hopes to change this state of affairs by exposing youths to a fishing experience and hoping it develops into a lifetime activity.

While learning to fish is perhaps the main goal, it is just as important that the participants learn the rules of safety, sportsmanship, and ethical behavior that accompany the sport.

The CATCH program has an annual statewide membership, and youngsters receive a membership packet with a membership certificate, embroidered patch, membership card, and informational brochures.

They also receive a quarterly newsletter with information concerning fishing, conservation, water safety, and aquatic biology. The newsletter gives CATCH members the opportunity to share their fishing experiences by sending in photos of themselves and their catches.

The most popular events are the CATCH fishing clinics held in the spring and summer to give members the opportunity to gain first-hand fishing experience and to learn by doing.

Last year—the first—six pilot fishing clinics were sponsored across the state. This year more than 20 clinics will be offered to CATCH members. These clinics rely heavily on volunteer help from wildlife clubs, fishing clubs, Trout Unlimited chapters, the N.C. BASS Federation, parks and recreation departments, and other interested individuals. These groups assist in organizing, publicizing, and conducting the CATCH clinics, and without this help, it would not be possible to conduct the number of clinics now being held.

"Our wildlife club was involved with the CATCH program from the very beginning," said Butch Mauldin, president of the Cabarrus County Wildlife Club. "We participated in the pilot clinic held in our area two years ago, and plan to assist again this year.

"It's one of the best programs sponsored by the Wildlife Resources Commission. The

1987 CATCH Clinic Schedule

Date	Location	Contact Person
April 4	F. I. Dupont Bladen County	Bruce Skinner E. I. Dupont (919) 483-4681
April 11	McLeansville Wildlife Club - McLeansville	V. W. Cobb (919) 272-0974
April 25	McGalliard Falls Park Valdese	Bob Green Valdese Parks & Rec. (704) 879-9372
April 25	Ft. Bragg Fayetteville	Rodger Hooper Ft. Bragg Youth Activities (919) 396-1278
May 2	Sandling Rec. Area Falls Lake Wake County	Edward Farr N.C. State Parks (919) 846-9991
May 9	River Park North Greenville	Howard Vainwright River Park North (919) 758-1230
May 16	Frank Liske Concord	Randy Daniels Frank Liske Park (704) 782--0411
May 16	Lee County Wildlife Club Sanford	Donnie Thomas Lee County Wildlife Club (919) 755-7131
May 30	C. G. Hill Park Winston-Salem	Nancy Bridgers Forsyth County Parks & Rec. (919) 727-2946
June 13	Rocky Mount City Lake Rocky Mount	Jerry Camello Rocky Mt. Parks & Rec. (919) 972-1155
June 20	McAlpine Greenway Park Charlotte	Doug Glover McAlpine Park (704) 568-4044
June 20	Roanoke/Chowan Wildlife Club Winton	Gilbert Vaughn R.C. Wildlife Club (919) 332-2123
June 27	Meade Lake Jackson County	Terry Lockhart Jackson Co. Parks & Rec. (704) 586-6333
July 11	Cherry Pt. Marine Base Havelock	Mark Morris Havelock Hoghunters (919) 447-9411
July 18	Shelley Lake Sertoma Arts Center Raleigh	Bob Hinnant Raleigh Parks & Recreation (919) 781-7685
August 1	Johnsons Pond American Legion Post Fuquay-Varina	Lynn Bradley Fuquay Parks & Recreation (919) 552-3178
August 15	Ashe County Park West Jefferson	Bob Richardson Ashe County Parks & Recreation (919) 246-3610
August 22	Patience Mullendore Campground South Toe River Yancy County	Larry Neuhs U.S. Forest Service (704) 682-6146

clinics are educational for both the children and the volunteers. And there's no better way to learn something than by teaching it yourself. Besides, it's a lot of fun."

The Roanoke-Chowan Wildlife Club became involved with the CATCH program last summer. The club hosted a CATCH clinic near Winton in Hertford County. "I heard about the CATCH program during a Wildlife Federation meeting and thought our club would be an ideal location for this type of activity," said club member Gilbert Vaughn. "We got the CATCH folks to explain it to us, and before we knew it there were 50 kids fishing at the pond!"

The Roanoke-Chowan Wildlife Club will assist in hosting CATCH clinics again this year, along with many other volunteers across the state.

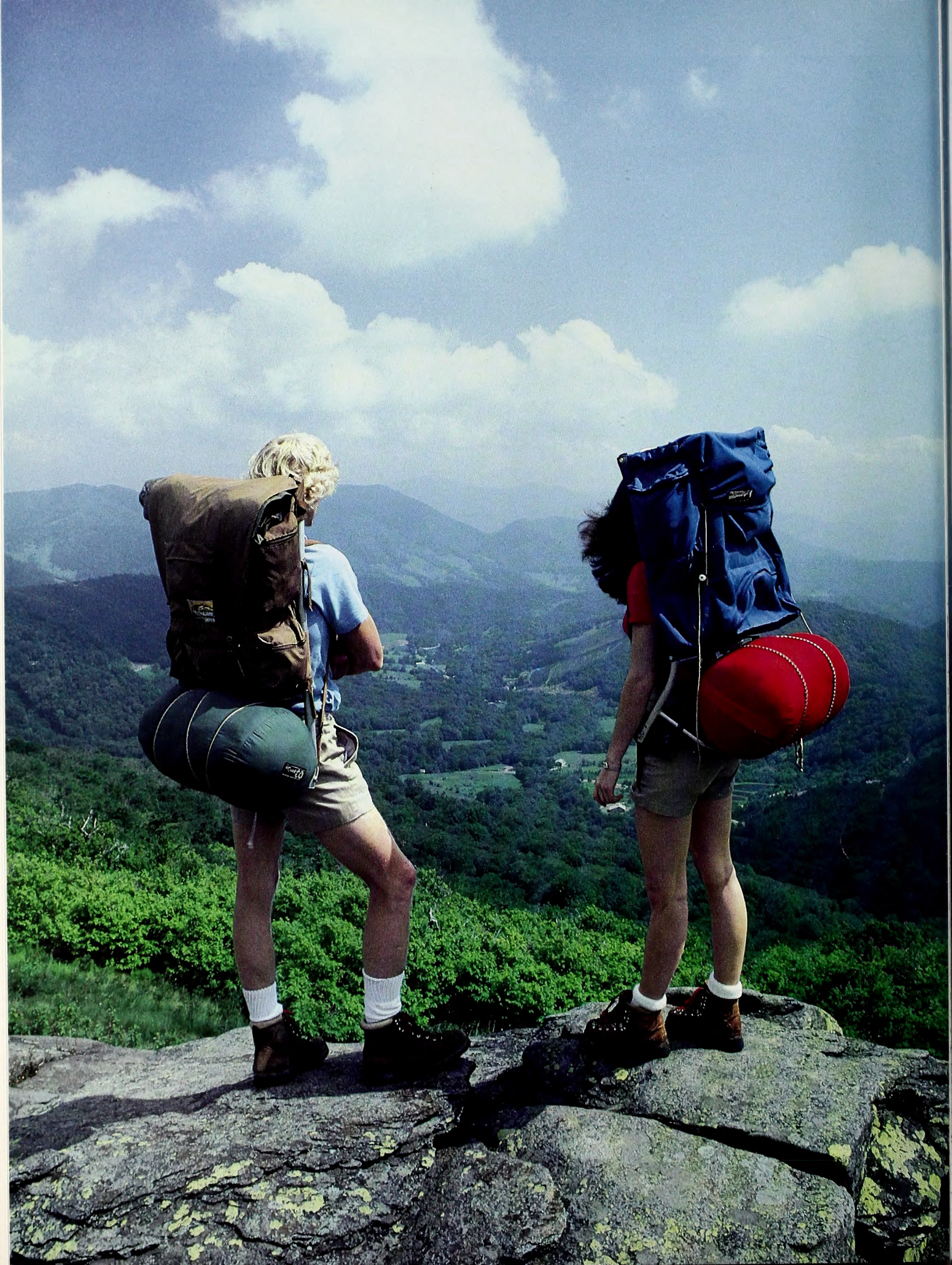
Tackle manufacturers and their representatives are also involved in the CATCH program. Rod and reel combinations, fishing line, hooks, weights, floats, and stringers have been donated from companies such as Zebco, Dupont Stren, Eagle Claw, and Betts Baits. Not only do the companies donate materials, but whenever possible the tackle manufacturing representatives attend clinics to talk with the young people about the proper use and care of fishing equipment.

Of course, Wildlife Commission employees also conduct sessions at the clinics that include lessons in fish identification and life history, water safety, conservation and ethics, and fishing techniques. It is not unusual to find a district fisheries biologist pulling a seine while the clinic participants anxiously wait to see what the net will yield. The netted fish are examined and identified before being carefully returned to the water. An enforcement officer may demonstrate the proper use of personal flotation devices or teach youths to identify types of trout stream boundary markers. Others demonstrate how ethics enter into fishing—how a good fishing spot can be lost if it becomes littered, or why observing fishing regulations is part of being a good sportsman.

As is the case with most kids who take part, Kevin's first fishing experience was a success. But it was no accident. It took a great deal of planning, coordination, and hard work to make it possible.

And the reward? Ask the volunteer who helped Kevin catch that first fish and saw the smile on Kevin's face. Or ask Kevin.

If you're a youngster between the ages of eight and 15, and would like to take part—or if you know a kid who might be interested—you can write for more information. Adult volunteers are also needed. To get the details, write: CATCH, N.C. Wildlife Resources Commission, 512 North Salisbury St., Raleigh, NC 27611.



Many superb hiking trails lace North Carolina from the coast to the mountains, and these are among the most popular.

by Kay Scott

KAY SCOTT

Crossing Jane Bald, *the Appalachian Trail reaches toward Roan High Knob.*

TEN FAVORITE HIKING TRAILS

It was a misty cold fall day when we shouldered our backpacks, making sure raingear was handy. You can never be too careful on these cold mountain balds. (Hiker's Law: Leave the raingear at home and it will always rain.) We set off on the Art Loeb Trail for a two-day backpacking trip. The wind across the high mountain ridge was sharp, whipping our words away.

I grew up less than 30 miles south of this place. Yet, I had never explored these balds until a flat-land weary spirit brought me running to a mountain friend, proclaiming my need for the healing of the hills. My soul had many questions. Just like the hills, my spirit was shrouded in mist.

We walked along the high trail. Suddenly, the mist broke. Down toward the valley I could see mountaintops undulating out of the fog. It was at that moment that I knew this trail would become one of my favorites—a place to return time and again.

What makes a place a personal "favorite?" Perhaps it is the way it touches us the first moment we walk there. It might be the view, the wildflowers or just the way we felt as we walked on a bright spring afternoon. We know we'll go there often. And if the trail has a reputation among hikers, surely it must have touched others in a similar way. Mount Mitchell, Grandfather Mountain, the Uwharries—these are names that recur in hikers' conversations like themes in a piece of music.

Hikers along the Appalachian Trail *survey the view. There are 293 miles of the Georgia-to-Maine trail in North Carolina, rewarding the hiker with overlooks like this one.*

This article will share some of these hiking trails, places that are special to many of North Carolina's hikers. (If one of your favorites was neglected, be glad. It's still your secret!) This diverse list came from such experienced hikers as Allen de Hart (author of *North Carolina Hiking Trails*), Randy Johnson (hiker and backcountry manager at Grandfather Mountain), Rob Sutter (hiker and endangered species botanist for the state) and Susan Curry (Trails Coordinator for the Department of Natural Resources and Community Development). Everyone has his or her favorites. This list shares some of ours with you.

Several sources for detailed trail directions are available. Certainly the most comprehensive is de Hart's *North Carolina Hiking Trails*. (Distance and other information have been borrowed from the first two editions of this source, with the author's permission.) Such detailed information is essential to provide a safe and pleasurable hike.

When hiking, particularly along the high mountain ridges, remember to carry plenty of warm clothing and rain gear. (Remember the "hiker's law"). In addition, be aware of the threat of lightning on the high ridges. Always carry adequate water or iodine pills to treat the water found along the trail. Finally, check the rules and regulations for each trail area before planning your trip.

The Art Loeb Trail

Distance:	29.9 miles
Location:	Pisgah National Forest near Brevard; Transylvania County
Trailhead:	Parking area on SE side of Davidson River.
Difficulty:	Strenuous
Information:	Pisgah National Forest, *NC Hiking Trails*, *"100 Favorite Trails"*

The 29.9 mile Art Loeb Trail will challenge Tar Heel hikers. This trail begins along the Davidson River near Brevard and climbs to the Shining Rock Wilderness Area, just off the Blue Ridge Parkway.

Spring and fall are the best times to hike this trail in order to enjoy the unique diversity which comes with the 4,000-foot elevation change. While spring is in full bloom along the Davidson River, the hiker will pass upwards through the earlier progressions of wildflowers and into an almost winter wonderland in the Shining Rock area.

Likewise, fall hiking will lead the sportsman through a forest bathed in reds and yellows, mixing with and changing to the greens of the spruce, fir and hemlock at the higher elevations.

Encountering a late spring or early fall snowstorm along the high balds of the wilderness area can lend an unexpected treat

N.C. TRAVEL AND TOURISM

***The 20-mile Uwharrie Trail** offers moderate hiking for Piedmont trailers. Located in Montgomery County, it is the only long trail in the Piedmont.*

to the walker prepared for this challenge.

The trail, located on national forest land and maintained jointly by the U.S. Forest Service and volunteers of the Carolina Mountain Club, offers the state's most unique trail blaze—the yellow silhouette of a hiker.

Elk Park to Roan High Bald; Appalachian National Scenic Trail

Distance: 12.6 miles
Location: Pisgah National Forest near Elk Park; Avery and Mitchell counties
Trailhead: U.S. 19E, Elk Park, N.C.
Difficulty: Strenuous
Information: *Tennessee-North Carolina Appalachian Trail Guide*

Two hundred and ninety-three miles of the Appalachian Trail wind across North Carolina. Built during the 1930s, this trail is now maintained by the volunteer members of the Appalachian Trails Conference and the federal government.

Any section of this well-maintained trail is a delight to walk. However, the section from Elk Park to Roan High Bald, stretching along the Tennessee/North Carolina state line offers a diversity of wildflowers unmatched on any long hike in this state.

Rob Sutter, endangered species botanist for the Plant Conservation Program in the N.C. Department of Agriculture, notes that, "During June and July the elegant Gray's lily will be found scattered throughout these balds and in the gaps between the balds. This species is found in wet meadows and at higher elevations in less than 40 places in Tennessee, North Carolina and Virginia.

"Because it is so rare," continues Sutter, "No one should dig up this plant. In fact, it is illegal to collect wild Gray's lily."

KEN TAYLOR

***From Whalebone Junction** to Ocracoke, the Cape Hatteras Beach Trail takes the hiker past the Hatteras Lighthouse and through maritime forest in Buxton Woods (just beyond lighthouse in photo).*

In addition to Gray's lily, the area offers a variety of other wildflowers through the spring, summer and fall. The Roan Mountain area not only offers breathtaking rhododendron displays in June and early July, but offers a cool alternative in late June or early July to the sticky weather found at lower elevations. Throughout the seasons, hikers are treated to displays of Indian paintbrush, bluets, gentians and asters.

Leaving Elk Park, this section of the AT passes over Hump Mountain (5,587 feet). On a clear day walkers are treated to a superb view of Mt. Rogers, Virginia, Beech Mountain and Grandfather Mountain.

Descending from Hump, the trail continues over the grassy balds of Big Yellow Mountain. Later it crosses the historic Overmountain Victory Trail and continues through forest and across bald to Roan High Knob.

Shanty Springs, Calloway Springs, Underwood and Grandfather Trails

Distance: Approximately 6.5 miles
Location: Grandfather Mountain, Avery and Watauga counties
Trailhead: Inversshiel Texaco (N.C. 105 and 184), about 15 miles SW of Boone
Difficulty: Strenuous
Information: Grandfather Mountain, NC *Hiking Trails*
A User Fee is Charged.

Although known for Mildred the Bear, Singing on the Mountain and hang-gliding tournaments, Grandfather Mountain's backcountry is one of North Carolina's best kept secrets. The mountain features a trails system with 25 miles of the state's best hiking.

A trip along the Shanty Springs, Calloway, Underwood and Grandfather Trails rivals the challenges of New England hiking. Visitors climb from the valley at Inversshiel to the high ridge on the Shanty Springs and Calloway trails. The combined Underwood

and Grandfather trails offer a memorable loop along the ridge of this high country.

On the Grandfather Trail, hikers scramble over house-sized boulders using a series of ladders. This trail is perfect for a day of challenging adventure.

A backcountry fee of $3.00 per day for adults ($1.50 per day for children of ages 4-12) is charged for use of this excellent system. (This fee does not permit automobile access through the main gate on U.S. 221 near Linville.) According to Randy Johnson, "Grandfather Mountain is privately owned. No tax money is used to maintain the trails. For less than the price of a movie, hikers on Grandfather can enjoy some of the South's most spectacular scenery."

Permit outlets vary, so read the trailhead sign or contact the backcountry manager at Grandfather before beginning your trip.

Cape Hatteras Beach Trail (Whalebone Junction to Ocracoke)

Distance:	75.8 miles
Location:	Outer Banks of North Carolina; Dare and Hyde counties
Trailhead:	Whalebone Junction Information Station, near Nags Head
Difficulty:	Easy to moderate
Information:	NRCD, Cape Hatteras National Seashore and Pea Island National Wildlife Refuge, *North Carolina Hiking Trails*

This trail, skirting the ocean throughout the Cape Hatteras National Seashore and along the Pea Island National Wildlife Refuge, is a perfect contrast to the environments of the high mountains. If offers the ever-changing drama of the seashore combined with a taste of marsh habitat and coastal woodland.

The trail passes near the three lighthouses of this section of the Outer Banks—Bodie Island, Hatteras and Ocracoke. The promise of spectacular birding in the wildlife refuge provides an added bonus for the hiker. The trail is a designated segment of the Mountains-to-Sea Trail, a system of trails which will one day cross North Carolina from Cherokee to Manteo.

The Cape Hatteras Beach Trail begins at Whalebone Junction Information Station nears Nags Head. It follows the coastline south, crossing the Oregon Inlet Bridge. Through the wildlife refuge the trail passes inland. Then, back to the beach for the trip south to Hatteras. From the lighthouse, the hiker explores Buxton Woods and continues to Hatteras Village. From the village, a ferry ride takes the explorer to Ocracoke Island, home of the wild ponies and the town of Ocracoke.

Because of the risk of dehydration, it is essential that an adequate supply of water be carried. Water is available at the public facilities listed in the Cape Hatteras Beach Trail brochure available from the Department of Natural Resources and Community Development (NRCD).

Because of heat, sunburn and a never-ending supply of bugs, particularly ticks, this trail is best hiked in winter.

City of Raleigh Greenway System

Distance:	20 miles total
Location:	Wake County
Trailhead:	See map for a selection of trailheads
Difficulty:	Easy
Information:	City of Raleigh Greenways Map

Trails Information Guide

North Carolina Hiking Trails by Allen de Hart. 1982; Appalachian Mountain Club, 5 Joy Street, Boston, Mass. 02108. (617-523-0636). This is the only comprehensive trail guide for the state. Purchase from the Appalachian Mountain Club or from your local outdoor store.

100 Favorite Trails of the Great Smokies and Carolina Blue Ridge, compiled by Carolina Mountain Club (PO Box 68, Asheville, NC 28802) and Smoky Mountains Hiking Club (PO Box 1454, Knoxville, TN 37901). This trail map, revised in 1984, offers descriptions of the 100 favorite trails. Order from: The Stock Room, PO Box 3149, Hickory, NC 28603 (1-800-438-1055 outside NC, or 1-800-222-1107, inside NC).

Tennessee-North Carolina Appalachian Trail Guide. Appalachian Trail Conference, PO Box 236, Harpers Ferry, WV 25425. (304-535-6331). Order this guide to the Appalachian Trail from the Appalachian Trails Conference or purchase at your local bookstore.

Trail and Road Map of Grandfather Mountain, Backcountry Manager, Grandfather Mountain, Linville, NC 28646. (704-733-4337). For information about or permits to hike Grandfather Mountain's system of trails contact the backcountry manager or any current permit outlet.

Cape Hatteras Beach Trail. Information on any other segment of the Mountains to-Sea Trail: Division of Parks and Recreation, attn: Susie Currie, Trails Coordinator, PO Box 27687, Raleigh, NC 27611. (919-846-9991).

Southern Snow by Randy Johnson. (1986; Appalachian Mountain Club, 5 Joy St., Boston, Mass. 02108. (617-523-0636). Purchase from Appalachian Mountain Club, local outfitter or bookstore.

National Forest Trails (Pisgah, Nantahala and Uwharrie National Forests) National Forests in North Carolina; PO Box 2750, Asheville, NC 28802. (704-253-2352).

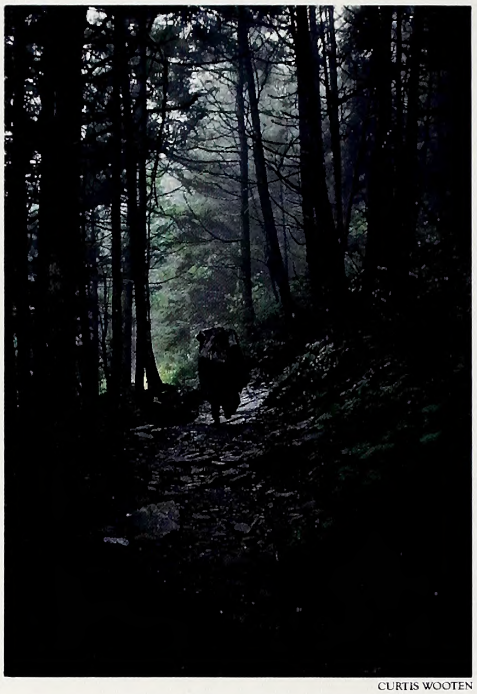
North Carolina Department of Natural Resources and Community Development, Division of Parks and Recreation, PO Box 27686, Raleigh, NC 27611. (919-733-4181). Contact NRCD for information about trails in state parks and state parks rules and regulations.

Division of Interpretation, Cape Hatteras National Seashore, Rt. 1, Box 675, Manteo, NC 27954. (919-437-211)

Pea Island Wildlife Refuge, Box 1026, Manteo, NC 27954. (919-987-2394). Information about the Cape Hatteras Beach Trail.

City of Raleigh Planning Department (919-890-3125) or City of Raleigh Parks and Recreation Dept. (919-890-3285), PO Box 590, Raleigh, NC 27602. Information on the City of Raleigh Greenway System, including the "Raleigh Greenway Map."

Ten Favorite Hiking Trails



CURTIS WOOTEN

***North Carolina's mild climate** means a longer hiking season, even in the mountains where winter begins earlier. Hikers should always carry raingear on mountain treks.*

Many cities are realizing the importance of providing their citizens with natural spaces preserved in the urban environment. The city of Raleigh was among the first in the state to realize this concern and to develop a greenway system.

This system features recreational trails for walkers, joggers, hikers, fishermen and picnickers. These trails connect many of the city parks and two of its major creeks, Walnut and Crabtree.

This trails system offers the urban hiker the experience of getting away from it all in the backyard of the state's second largest metropolitan area. Just 10 years from its beginning, the greenway has developed into a 20-mile, 600-acre system. A greenway map, available for $2, details the system, listing trails, parking areas, trail length, facilities and even fishing areas.

Black Mountain Crest Trail

Distance:	12 miles
Location:	Pisgah National Forest; Yancey County
Trailhead:	Summit parking area at Mt. Mitchell State Park
Difficulty:	Strenuous
Information:	Mt. Mitchell State Park; Pisgah National Forest; *NC Hiking Trails*

Ask any mountain hiker to name his or her favorite ridge trail. You will find that one trail is mentioned more often than any other—the Black Mountain Crest Trail. This is perhaps North Carolina's most spectacular and, according to Allen De Hart, most difficult trail. It is also the hardest to include on this list of the 10 most spectacular.

Following the crest of the Black Mountains, the state's highest chain, from Mt. Mitchell State Park to Celo Knob and Bowlens Creek Road near Burnsville, this trail offers an unforgettable view of these high mountains. It also provides a lesson on the effects of pollution. On all sides of the trail the evergreen trees are dying—a graphic example of the effects of acid rain or, perhaps, some unknown natural phenomenon. This trail is a reminder of the frailty of the earth's ecosystems.

The Black Mountain Crest Trail also suffers from overuse and under-repair. Following his latest walk along this trail, Allen de Hart noted that, "Something had been lost from this trail from what I had first seen here." However, no list of the state's best would be complete without this old favorite.

From the parking lot at Mt. Mitchell State Park, follow the trail across Mr. Craig (6,645 feet) and Big Tom Mountain (6,593 feet) to Deep Gap. Hiking this trail involves scrambling over large rocks and boulders, no easy task with a 40-pound pack. There is a shelter at Deep Gap. From the shelter, continue along the trail to Celo Knob and to the terminus at Bowlens Ceek, near Burnsville.

Uwharrie Trail

Distance:	20.5 miles
Location:	Uwharrie National Forest; Montgomery County
Trailhead:	Parking lot on N.C. 24-27 at junction with FSR 517
Difficulty:	Easy to Moderate
Information:	Uwharrie National Forest; *NC Hiking Trails*

The Uwharrie Trail is unique because it is the only long North-South trail in Piedmont North Carolina. Because of its location, it is best hiked in early spring or late fall when the weather is cool. It offers Tar Heel sportsmen a hiking alternative during seasons when it may be undesirable to hike the high mountain trails.

The trail crosses national forest land over one of the oldest mountain ranges in North America. Hikers will see reforestation efforts and several old mines. The Central Piedmont Group of the Sierra Club, the Uwharrie Trail Club and the U.S. Forest Service maintain this trail.

Balsam Highlands Section, Mountains to Sea Trail

Distance:	9.0 miles
Location:	Pisgah and Nantahala national forests; Haywood and Jackson counties
Trailhead:	Parking area on N.C. 215
Difficulty:	Easy to Moderate
Information:	NRCD; Pisgah and Nantahala national forests

Spectacular views, quiet forest environs and an appealing array of blueberry bushes that fruit in June—they're all yours on what Allen de Hart has christened his "bees, berries and butterflies hike." Go during the early summer months and you'll get all three.

This is a new trail, recently developed by volunteers of the Balsam Highlands Trails Task Force and the national forest, and a designated segment of the Mountains-to-Sea Trail. It passes through national forest and Blue Ridge Parkway lands.

Passing on both the north and south sides of the Parkway, this trail offers a variety of vistas coupled with walks through the dense forest undergrowth and, not to be forgotten, blueberry bushes for the hungry hiker.

From the parking area on N.C. 215, follow the trail north of the Blue Ridge Parkway toward and around Mt. Hardy. Continue along the trail to Buckeye Gap and to Haywood Gap. Cross to the south of the Parkway at Haywood Gap. The trail will lead to Wet Camp Gap and to spectacular views near Rough Butt Bald. From Rough Butt Bald, hike to Bearpen Gap Parking Area on the Blue Ridge Parkway.

Wolf Rock, Cedar Rock and Stone Mountain Falls Trails

Distance:	5.6 miles
Location:	Stone Mountain State Park Wilkes County
Trailhead:	Parking lot and information area at the base of Stone Mountain
Difficulty:	Easy to Strenuous
Information:	NRCD; *NC Hiking Trails*

This trail offers one thing most often

CURTIS WOOTEN

***Spectacular view** awaits the hiker on Hawksbill Mountain, along the rim of the Linville Gorge Wilderness Area. The 11.2-mile Shortoff Mountain Trail is a moderate to strenuous hike.*

lacking in a single hike—a wide variety of experiences. Located in Stone Mountain State Park, the combined Wolf Rock, Cedar Rock and Stone Mountain Falls trails described in *NC Hiking Trails* challenge the hiker to enjoy an excellent trail through forest, along an old field, beside a stream and spectacular waterfall and over the granite dome for which the park is named. Wildlife is abundant along the trail.

From the parking area, follow the Wolf Rock trail through the forest. Wolf Rock provides outstanding views of the surrounding countryside. Continue along the trail to its junction with the Cedar Rock trail. At the junction with the Stone Mountain Falls trail, quietly look for deer in the old field at the base of Stone Mountain. The falls trail will take you to Stone Mountain Falls or 'Beauty Falls.' From the base of the falls, follow the steep trail to the top of the 200-foot falls and then continue over the granite dome. Walking on this rough granite seems to let the hiker defy gravity.

Shortoff Mountain Trail

Distance:	11.2 miles round trip
Location:	Pisgah National Forest; Burke County
Trailhead:	Parking Area and picnic grounds at Table Rock
Difficulty:	Moderate to Strenuous
Information:	Department of Natural Resources and Community Development; Pisgah National Forest; *NC Hiking Trails*

Certainly no list of favorite trails would be complete without listing this fine trail. Located in the Pisgah National Forest, the Shortoff Mountain Trail skirts the Linville Gorge Wilderness Area. Part of a designated segment of the Mountains-to-Sea Trail, it is maintained by volunteers of the Central Blue Ridge Task Force and the USFS.

From the parking area at Table Rock, follow the ridge south to the Chimneys at .8 miles. The Chimneys are a popular area for rock climbing. Along the trail the hiker is treated to views of Table Rock, Hawksbill, Shortoff and Wiseman's View. From the area of the Chimneys you can view Mt. Mitchell and the Black Mountains chain on a clear day.

Leaving the Chimneys, follow the trail's steep descent to Chimney Gap (1.8 miles) and continue to Shortoff at 5.6 miles. Shortoff offers fine views of the Linville River as it passes from the gorge into Lake James. (The Mountains-to-Sea Trail continues on to Kistler Memorial Highway). Return via the same trail to Table Rock for an 11.2 mile round trip. (The steep ascent from Chimney Gap to the Chimneys offers quite a challenge.) ⊠

Guardians OF OUR WATERS

North Carolina's Stream Watch program is four years old, and has become a model for similar programs across the country.

COLIN OSBORNE III

***Trash cleanups**, such as this one on the Lumber River, are popular Stream Watch projects. Others include educational programs, outings, and fisheries habitat improvement.*

by Mark Taylor

A photographer shoots a picture of an old wooden boat in a salt marsh at dusk. A junior-high school biology class collects insects from a mountain stream. A group of disadvantaged kids clear trash from an urban stream.

What do all of these activities have in common? All are part of North Carolina's Stream Watch program, an innovative effort by the N.C. Department of Natural Resources and Community Development to encourage citizens' groups to "adopt" waters in their areas.

The Stream Watch program began in 1983, and shortly thereafter the Z. Smith Reynolds Foundation gave the Department a $30,000 grant to provide mini-grants to fledgling Stream Watch organizations. The program proved to be very popular, and today 111 Stream Watch groups have adopted over 80 different streams, lakes and rivers across North Carolina.

"The basic goals of Stream Watch haven't changed since the program began," said Jim Mead, Stream Watch coordinator for the N.C. Division of Water Resources. "We're trying to increase awareness of the need for clean water, provide a voice for these waterways in land-use planning decisions and create a link between concerned citizens and state agencies. By getting people out on these waterways, and involved in the decisions that affect their future, we hope to see cleaner water in the long run."

The range of Stream Watch projects is as varied as the groups involved in the program. The photographs which illustrate these pages, for example, were drawn from a statewide Stream Watch photography contest. Most projects, however, are accomplished by single Stream Watch groups on individual waters.

"Stream cleanups, educational projects, and recreational activities are all popular Stream Watch activities," said Mead. "However, the program is by no means limited to these, and the organizations involved in Stream Watch range from youth and environmental groups to sportsmen's clubs and homeowners' associations."

The Rocky River Chapter of Trout Unlimited in Charlotte has been the most active sportsman's group involved in Stream Watch. Last year, the Charlotte sportsmen were honored with TU's Golden Trout award for being the most active chapter in the nation. The group has adopted the Wilson Creek watershed on the slopes of Grandfather Mountain, and also Frankum Creek in Caldwell County.

"Trout Unlimited is strictly a conservation organization dedicated to the protection of our cold-water fisheries, and the Stream Watch program fits in well with our club's goals," said Dennie Burries, chapter president. "Frankum Creek is marginal trout water, and we've done a lot of work there to improve

***The Neuse River** is one of 80 rivers, lakes or streams adopted through Stream Watch. Although Stream Watch groups are found statewide, more are needed, especially in the Coastal Plain.*

DAVID H. HOWELLS

CHOWAN RIVER AT CANNON'S FORD — DAVID H. HOWELLS

LUMBER RIVER AT RIVERTON PARK IN WAGRAM — COLIN OSBORNE III

LUMBER RIVER NEAR LUMBERTON — COLIN OSBORNE III

"We're trying to increase awareness of the need for clean water, and also to provide a voice for these waterways in land-use planning decisions. By getting people out on these waterways, and involved in the decisions that affect their future, we hope to see cleaner water in the long run."

the habitat already. We've built rough-fish barriers, added structure to provide cover for trout, removed rough fish, and restocked the waters with rainbows and half-wild browns. Although this work was funded by the national organization of TU and through our chapter fund-raising banquet, we consider Stream Watch an important program and encourage other Trout Unlimited chapters to become involved."

Larry Sloop is a science teacher who has been involved in Stream Watch since the program began, and has found it to be a valuable educational tool. While teaching at a junior high school in Wilkesboro, he used the nearby Reddies River as an outdoor classroom. He now teaches at nearby East Hiddenite Junior High School, and has created a classroom computer program especially for Stream Watch.

"The computer program has been very popular with the kids," he said. "We start by going down to our adopted stream, Greasy Creek, and note the color of the water, its smell, and the type of land which borders it. We record these observations and others, and then go back and enter them into a simple computer program. If the kids note a bad smell and a lack of aquatic insects, for example, the program might indicate a problem with a discharge of raw sewage, and the kids can go back and look for it. This program is compatible with Apple computers, and may be used in general science and biology classes from about the fourth grade through early high school levels. I've made copies of the program for about a dozen teachers, and some of the kids have liked it so well that they've even pirated my software for their home computers."

Other Stream Watch groups are combining recreation and education. The Capital Group of the Sierra Club in Raleigh, for example, is using Project WILD to design a Stream Watch outings program for groups which work with inner city and disadvantaged youth.

"We've been involved in Stream Watch for several years, and have also been working with inner-city kids," said Wolfgang Friedrich of Raleigh, Stream Watch co-chairman of the group. "We thought it would be a good idea to combine environmental education with our inner-city outings program. Most of these kids are from low-income housing projects, and they don't often get a chance to spend time in the woods. When they do, we want to be sure that they learn something about conservation and our natural world in addition to having a good time. So, we're developing and field testing a set of water-based Stream Watch outings and activities that organizations anywhere could use with disadvantaged youth. We plan to incorporate this into a leader's manual and training package next year, and hope to use other Stream Watch groups to introduce it to big brother and sister organizations across the state."

HAW RIVER DAM AT ALTAMAHAW — DAVID H. HOWELLS

One of the most active Stream Watch groups has been the French Broad River Foundation, an Asheville-based organization that was formed in 1983.

"The cleanup of the French Broad River in the 1970s created new interest in our waters," said LaRue Bolick, Stream Watch coordinator for the group. "Consequently, we've tried to get other organizations in the four-county watershed involved in the protection of the French Broad through Stream Watch. Several other organizations have adopted portions of the French Broad and its tributaries, and every spring we sponsor a big cleanup effort called Clean Streams Day. Last year, for example, over 2,200 people representing 33 different organizations cleaned 204 miles of stream on 53 different waterways in Buncombe, Henderson, Madison and Transylvania counties on Clean Streams Day."

In recent years, there have been some changes in the Stream Watch program. The criteria for obtaining grants, for example, have become more complicated.

"The first Stream Watch grants were designed to provide seed money to get new Stream Watch groups started," said Mead. "Now that there is already a core of Stream Watch groups in existence, the grant program has changed to encompass projects which have statewide application.

"Of course, you don't need to have a Stream Watch grant to be involved in the program. The Rocky River Chapter of Trout Unlimited hasn't applied for any grants, and they're an excellent Stream Watch group. We're happy to work with any group that is interested in Stream Watch, and we especially need more Stream Watch groups in the coastal area."

Anyone who is interested in adopting a river, lake, stream or estuary should write to Stream Watch, N.C. Division of Water Resources, P.O. Box 27687, Raleigh, N.C. 27611. ⊠

Occoneechee Trapper

Q.J. Stephenson has tended his traplines in this Roanoke River backwater for over 50 years, and has developed an uncommon appreciation and understanding of nature.

interview by Lawrence S. Earley and Ted Dossett

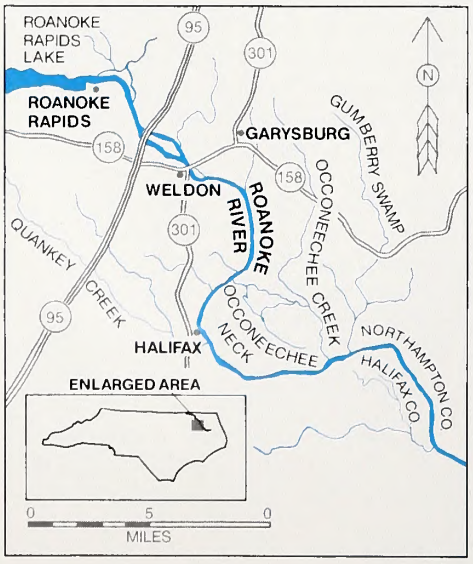
Before the dams were built above Gaston, the upper Roanoke River was a desperado, rampaging across the flood plain with dismaying frequency. Despite the river's violent disposition, European settlers found the fertile river valley to their liking and spread broad plantations along the banks. Before them, Indians took full measure of the abundant wildlife and the spawning runs of rock fish, shad and herring. The low-lying land was laced with swamps and ponds that attracted waterfowl, deer and beaver. In Halifax and Northampton counties today, names such as Occoneechee Neck, Wildcat Swamp, Potecasi Creek and Urahaw Swamp still suggest the wildlife and Indian heritage of the region.

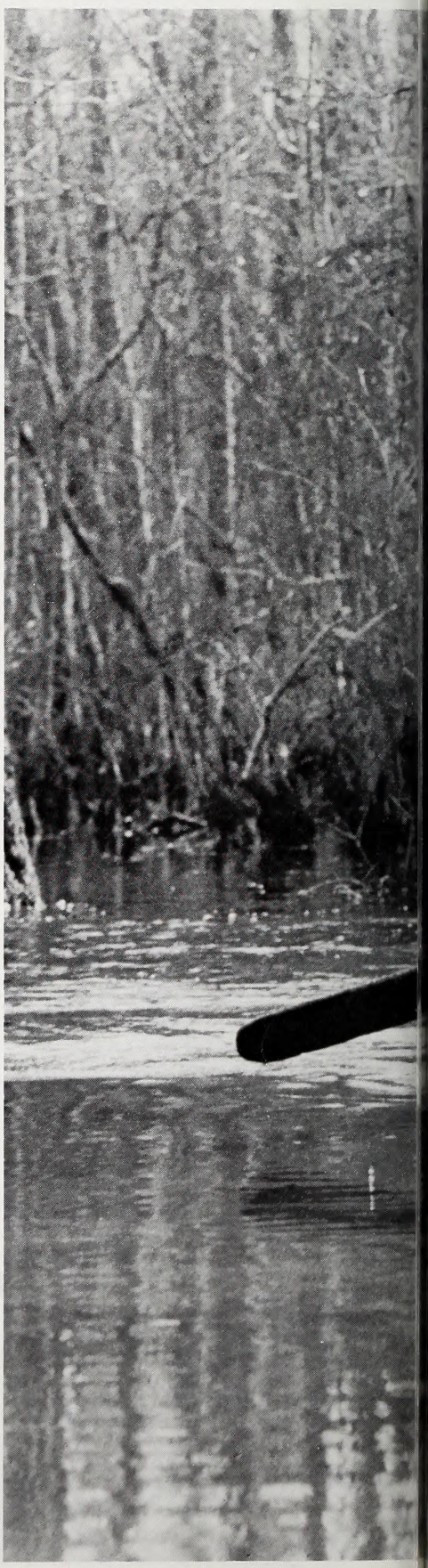
Q. J. Stephenson of Garysburg (pop. 231) knows the streams and swamps of the upper Roanoke like the veins on his hand. He is one of the best and most knowledgeable trappers in the country, but what distinguishes him as a trapper is his vast curiosity about the animals he stalks and their wetland habitats. Like the mountain men he idolizes, he is attuned to the land and the movements of animals.

Although his schooling stopped at the eighth grade, Stephenson never stopped learning. "I haven't just been a trapper," he says. "I've studied the earth." He can spot Indian sites by looking at the lay of the land, and his discoveries of flotsam from ancient seas have drawn scientists from the Smithsonian.

In the small museum that stands near his home, Stephenson welcomes school groups and backroad wanderers to talk and gaze at his fossil discoveries. In recent years he has begun to create animal sculptures from sharks' teeth and Indian points, developing a new reputation as a folk artist.

Early this year, Q. J. Stephenson talked with Wildlife in North Carolina about his life along the Roanoke. Some of his stories and reflections follow.





LAWRENCE S. EARLEY

Q. J. Stephenson *glides out of a cypress swamp near Garysburg in his one-man pack canoe. His canoe is lighter and more maneuverable than two-man canoes, enabling him to get into remote places by himself.*

I was born across the river from Garysburg in 1920. I've been right here all my life. When I was a boy growing up, the Roanoke River was probably one of the wildest rivers in the eastern part of the country. The water level never stayed the same. The rising and the falling was just terrible, you know. I remember seeing the floods. We'd go down to the river and see rabbits and goats on a little floating island coming down the river. When they built the dams, that stopped all of that. It rises pretty high now, but no flood stage.

When I was a boy I took a trip on the upper part of the Roanoke River, above Roanoke Rapids, say 10 or 12 miles. There was virgin timber up there then that had never been cut. This saw mill operator put up two saw mills over there on an island, and that river was as pretty as any river in the United States at that time. I've been all over the United States, but I haven't seen any section yet as pretty as that river. They started cutting that timber and the smell of that timber when they were cutting it is something I'll never forget as long as I live. It was a sweet smell. That was virgin wood. That was beautiful country up there and it's all under water today.

I was about eight years old when I started trapping. Life was pretty hard back in those days, you know. We were approaching the Depression and wages on the farm were 75 cents from sunrise to sundown. And I received price lists from Albert H. Sams fur company through the mail. Even back then muskrats were selling for $1.35.

So one day I crossed the highway and went into this little marsh about a mile from home. And I saw these little muskrat feed beds under the willow trees where they were eating the roots and shoots. And I had two muskrat traps. I went back and set those traps—I think it was a bad-looking Christmas for everybody that year. And I think I caught six muskrats before Christmas Day and sold them and we had a big Christmas. Because for two dollars you could go to the store and buy a week's groceries back in those days. Eggs were a penny apiece. Flour was 25 cents a bag.

From then on I was after the muskrats.

When I was a boy the fur trade on the Roanoke River, especially in this area, was a big business. There were three fur buyers in Weldon alone. There were a lot of coon hunters back then. They'd kill coons and carry them to the fur buyers. Get 'em a week's groceries with a coon. There were a lot of trappers, but there was hardly anything to trap. Back in those days, coon were extremely scarce. If you caught 10 coons a winter you were doing excellent. There were practically no otters at all back then.

LAWRENCE S. EARLEY

***Stephenson** is an accomplished folk artist as well as a trapper. Several of Stephenson's works are displayed on the wall of the roadside museum he built near his home. The subjects of his folk art are the animals and artifacts associated with his life as a trapper.*

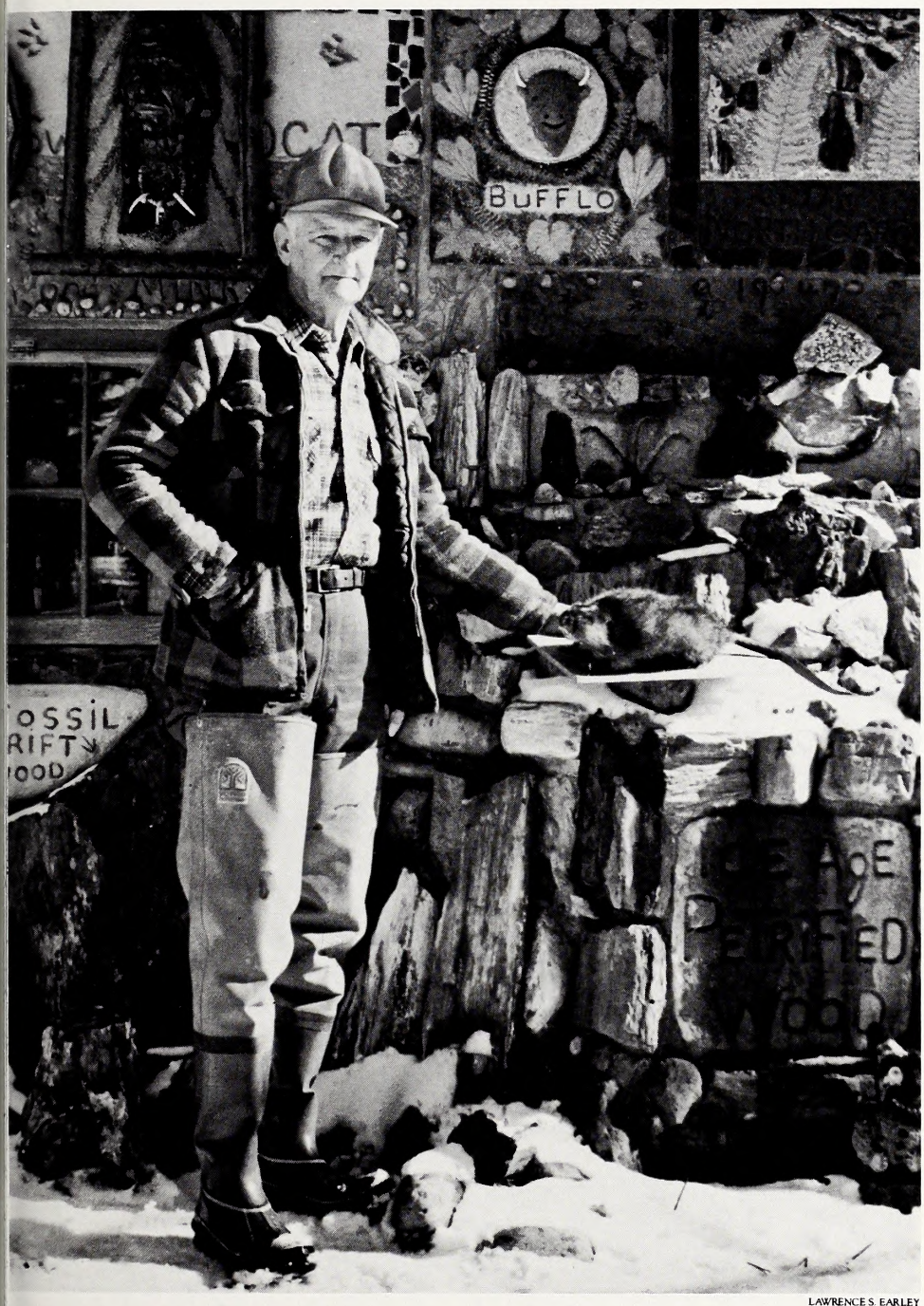
What increased the fur was the beavers. There were no beaver in this state when I was a boy. They were restocked. I'd say we have twice the amount of wildlife now. They increased the otter population, the muskrat and coons and deer and everything else. When a beaver builds a dam back in a swamp, it's a wildlife heaven. No doubt about it.

The first time I saw a beaver was in 1955, or maybe even earlier than that. They were strange looking animals to me. I had read about them all my life, but I had never seen one. And then I was able to watch them a lot. Some evenings I'd watch them building their dams. It was a curiosity to watch them. I learned a lot of things, and it weren't true what I often read.

Beavers don't eat the wood of a tree. The purpose in a beaver cutting a tree is to get the top branches, the little tender branches. That's his favorite food. And he will eat the bark on down if it's tender. In most places, beavers don't even cut trees. Like that marsh I took you to. They feed off that marsh vegetation. Cattail roots and watergrass, all kind of wild swamp life. They go under those roots, bring them to the top and pile it up. In places like marshes, they prefer that.

I don't generally start trapping before the weather gets good and cold. I never start at the opening of the trapping season, because most of the time it's warm. The fur of muskrat and beaver especially don't even start to get good until the last of January and the month of February. They're at their best in February, latter part of January. But the otter has to be trapped early because the fur will get "singed," as they call it in the fur trade. Where they're slick and pretty at the first of the season somehow nature causes the tip of the hairs to curl just a little bit toward the last of the season. Otter start mating then, and they mate viciously, too. The female can be tore up bad at that time of year.

I set my beaver traps mostly in the channels under water. They have main channels that they travel up and down. That's where I get most of my beaver. When I go to a beaver pond, I don't set at the front end, where the dam's at. I try to avoid that because most of the beaver are actually in



LAWRENCE S. EARLEY

***Along the creeks and streams** of the Roanoke River, Stephenson has stalked otter, beaver, muskrat and mink. But he's also found Indian artifacts and troves of petrified wood that date back millions of years. "I haven't just been an ordinary trapper," he says. "I've studied the earth."*

the back end. The water in the front end is too deep anyway—you're not going to see the channel unless there's one below the dam. But I go to the back end, that's where you'll see the channel. You can just look down under water and see it. Maybe two or three feet deep. They look like highways to a beaver.

Muskrats are the backbone of the fur trade because they're easier to trap than other animals, and they're more plentiful. A good muskrat trapper on the marshes in Louisiana and Maryland takes 100 muskrats a night whereas he may not catch a mink in two or three weeks. We don't have those kind of marshes around here, but I can still go out and catch between six and 20 muskrats a night when the weather's right. By that I mean when the water's not froze over.

Muskrats in North Carolina now are like people—they've gotten lazy. They let the beaver take care of them. You know how the beaver goes down and digs roots and stuff out of the bottom? Muskrats hardly ever do any cutting any more. They feed on the beaver pile because the beaver brings up all these fresh roots from the bottom.

You find muskrats where there'll be little pushups of grass and roots and things like that. Most of the time they're about a foot across. I set my trap on the edge of it, maybe reach down in the mud and pull up some fresh, shiny roots and put them up there. That'll attract him. Or I'll put my trap on little crossings, on logs. Muskrats come up on logs a lot. I'll bait it with mussels and snails and stuff like that.

Otters are the hardest animal in the world to trap. The reason is they got a range of 30 or 40 miles. Say an otter and his family come up a stream today, they may not be back up the stream for months, or they may be back in two days, you never know. The reason why most people have a hard time catching them, they walk the land as much as they do the stream. I have followed them in the snow for miles and miles. There's just certain sections of a stream that they're going to swim when they're coming up a stream and you've got to know which section it is or you'll never catch him.

Otters are just like a man—they've got certain fishing spots along every stream, every swamp, and they'll fish those spots year after year. You may walk the whole stream and not find a good otter set, or even see a sign or track of otter unless you know what you're looking for. But if you know where his fishing hole's at you don't have to see his track, you don't have to see his sign. You put in those sets and wait for him to come back. Generally it pays off for me.

I don't know what in the world's happening to mink. For seven or eight years they've just about disappeared. When I was a boy I used to walk from the house over there. I had a circle—it couldn't have been over three miles—and I averaged 20 mink every winter just off that circle. But now, there's just not any.

I dearly love the streams of this state, not just the trapping. I get out in the summer and just walk the streams. You see things that other people never see. In fact, one day I had an argument with a groundhog. It was January, everything was froze over and I was down in Occoneechee Neck. There were two huge hills. Beavers had built them a dam between the hills, you know. And the top of

the dam was maybe 8 inches wide. And it was new country to me. I had hardly ever been in there before.

I started down the hill, walking toward the beaver dam, and this big groundhog started from the other side across that 8-inch dam. We got up to each other, I reckon within 20 inches of each other, and the groundhog stood up on his hind legs. He chattered at me. I'm sure he was cussing in groundhog language. I just wanted to see how long he'd stay there, see which one of us was going to give way first. I just stopped right still, and he was standing in front of me just chattering and cussing. I stood there until I got tired of it, and I stepped off the beaver pond into the back side of the pond and let him past.

I haven't been a trapper like an ordinary trapper. I've studied the earth. Take walking along the Roanoke River. You come out in a field and you have a high rise, a raised point. Pays to go over and look at it because most of the time you'll find traces of Indian life—broken arrow heads, pottery, stuff like that.

I was working at Enfield one evening with a dragline between two deep hills. And I was setting there thinking it was a beautiful spot for the Indians to camp, had a beautiful spring coming out one of those hills, you know. I was digging an irrigation pond right in the bottom. That evening we had a bad electrical storm. So I cut the machine off and sat in my truck, and the rain just whipped those hills from each side. In an hour or two the sun came out just as pretty. I walked around the edges of those hills and picked up a pocketful of the prettiest arrow heads I've ever seen in my life. There was broken pottery. My hunch was right. It was just what I thought. It was where the Indians had camped.

Unlike the majority of the trappers in the United States, I've kept my eyes on the streams and rocks. I've hunted streams for years and years for petrified wood. When I was a boy, my first job was working in the gravel pits here in Garysburg. Every once in a while these rounded specimens of petrified wood would come up with the gravel. That's where I became interested in it. I'd look at

LAWRENCE S. EARLEY

Come winter, *Stephenson tends his traps in the abundant swamps and streams of the Roanoke River. He has spent most of his life in the outdoors. "I guess you could call it the call of the wild or something," he says. "It's in some of us stronger than others."*

LAWRENCE S. EARLEY

***Q. J. Stephenson** took to the swamps when he was a boy, exploring the upper Roanoke River before the dams above Roanoke Rapids were created. "That river was as pretty as any river in the United States at that time," he says. "There was virgin timber along the banks."*

the dump piles and try to find these pieces of wood.

When I go out to hunt for petrified wood, the first thing I look for is blue mud, maybe up in the stream bank. Even when you dig a well here in the Coastal Plain or in most of North Carolina you're into that blue mud. That's the sediment from the ancient sea. I look for the exposure of that blue mud, and most of the time there will be shells laying in the creek wherever I find that blue mud. That's when I start probing under the sand. A lot of times pieces will by laying there in the creek, you know, where the creek's close to bedrock and couldn't get covered up. But 90 percent of the time it's covered up with sand and not very deep. Once you find it, it can weigh 200, 300 pounds or just a pound or two.

Some fellas from the Smithsonian Institution were here looking at the specimens I found. Some of the wood they dated was 30 and 40 million years old. They explained to me that when the tree was living it probably grew up in Canada or maybe Pennsylvania or New York state. Millions of years ago it was brought down the same way the gravel was. The gravel under North Carolina was not put there by rivers. He explained to me that the ice sheet came down over Pennsylvania and a little further south, and he says that when it warmed up they had what they called a "big slush." People can't understand how petrified wood is rounded off and smoothed on the edges. Well, you see, it was pushed for thousands of years by the slush, just like a rock rolled in a river. The edges were wore off. That big slush brought all that gravel and broken pieces of wood down.

One time I went to set a mink trap and a big log was sticking out of the bank. Had a small hollow in it. I reckon the hollow couldn't be any more than three or four inches. I used to catch a lot of mink by putting a piece of bait back in a hollow like that. I went to setting a trap in this hollow, and I went to scraping around a little bit to scrape the dirt off it. Instead of being wood it was bone. I dug back in there and got it out. I guess it was four feet long, about as big around as the upper part of my leg.

I got to wondering about that thing. So my daughter went down there with me one pretty day. We dug underneath it and we got two or three more bones. It was broke up. It was in the blue mud exactly like the wood, you know. It had been broke and scattered. The second time we were down there we found a mastodon's tooth with the enamel still on it. It was definitely a mastodon, because I had the bones tested.

People come to my museum out by the road and look at my collection of petrified wood and they ask me how I find these things. They want to go with me. I say, you just don't go out there and pick that stuff up like that. You got to know something about the earth, and a lot about it, to find it because the average person would roam his lifetime and not find it.

I'm not very religious. But some days when I'm out on a trapline, I'm mighty religious. Not in the way that most people are, but I see a grand plan, a master plan. And sure there had to be a master mind behind it all, and at the beginning.

When I'm trapping muskrats sometimes, I reach under the water and get the tender roots. I bring up some of the prettiest things. Lots of times I taste them — they look so good, I want to see what they taste like. Some of them have got just the sweetest taste. You know there might be hundreds of things like that that man could eat that we don't know a thing about. In all the years I've been trapping, I've always wished I had enough education to identify swamp plants, all those hundreds of thousands of them that pop through the earth. Some of them are beautiful. Wouldn't it be wonderful to know what each one was, and what purpose it served?

I've spent just about all of my spare time in the swamps. Summer time I used to hunt for fossils and stuff like that. Just winter time I trapped. I guess you could call it the call of the wild or something. It's in a lot of us stronger than others. We got to be out there, that's it. We got to be away from other people, for one thing. I really prize my being by myself like that. My wife has fussed with me all my life. "If something happened to you, nobody in the state of North Carolina would know where to look for you."

I say, well, if I go, that'll be the way I'd like to go.

To view an 11-minute film on trapping featuring Q.J. Stephenson, write or call: Debby Conger, Division of Conservation Education, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, NC 27611. 919-733-7123.

The black and white film is one of many films, film strips and slide shows that can be loaned free from the audio-visual library of the Division of Conservation Education. ⊠

Carolina Profile is a periodic feature in Wildlife in North Carolina. *In these interviews, men and women reflect on their outdoor experiences and on what the land and its resources mean to them.*

Two ATVs Donated

Commission Wild Turkey Project Gets New Wheels

Written and Edited by Mark Taylor

Wildlife biologists who work with wild turkeys in North Carolina recently got some "new wheels" thanks to the Charlotte Banquet Chapter of the North Carolina Wild Turkey Federation. The Charlotte group holds a large fund-raising banquet every year, and the funds from the 1986 banquet recently purchased two all-terrain vehicles for wild turkey work. One was donated to the N.C. Wildlife Resources Commission, and will be used for wild turkey projects in eastern North Carolina. The other was given to Clemson University, and will be used on wild turkey research projects in western North Carolina.

"Sportsmen in the Charlotte Chapter wanted to use the funds raised by the banquet to purchase something that would help with turkey research and management programs," said Glenn Harrellson, banquet chairman for 1985-86. "Much of the turkey work is done in remote areas, and these vehicles will fill a real need. Other banquet funds help support several wild turkey research projects."

"The Wildlife Commission is grateful for the donation of this vehicle, and the excellent support that our wild turkey project has received from the Charlotte Banquet Chapter and the entire membership of the N.C. Wild Turkey Federation," said Grady Barnes, section manager of research and regulations for the Division of Wildlife Management. "The vehicle that was donated to us this year will be used in restoration projects near the coast. For the coming year, we plan on restoring turkeys on the Roanoke River in Hertford County, Camp Lejeune in Jones County, and Merchant's Millpond in Gates County."

This is the second all-terrain vehicle that the Charlotte Banquet Chapter of the N.C. Wild Turkey Federation has donated to the Wildlife Commission. The first was donated in the winter of 1986, and is being used in a three-year study of the effects of flooding on wild turkeys along the Roanoke River.

KAY SCOTT

A Welcome Gift: *The Charlotte Banquet Chapter of the N.C. Wild Turkey Federation recently donated two all-terrain vehicles to the Commission's wild turkey project. From left to right are Jim McTyre, president of the N.C. Chapter of the Wild Turkey Federation, Glenn Harrelson and Bill Luckey of the Charlotte Banquet Chapter, Rickey Davis and Derik Reed, wildlife biologists from Clemson University, Robert Sinyard of the Charlotte Banquet Chapter, and Brian Hyder, southeastern field director of the National Wild Turkey Federation.*

Twenty-Four Year Veteran Of Commission

Ragland Named Enforcement Chief

William Harold Ragland of Clayton, a 24-year veteran wildlife officer, has been named colonel of the Wildlife Commission's Division of Enforcement.

Ragland replaces Colonel Winfield Rhyne, who recently retired after 31 years of service. Ragland formerly served as major of field operations.

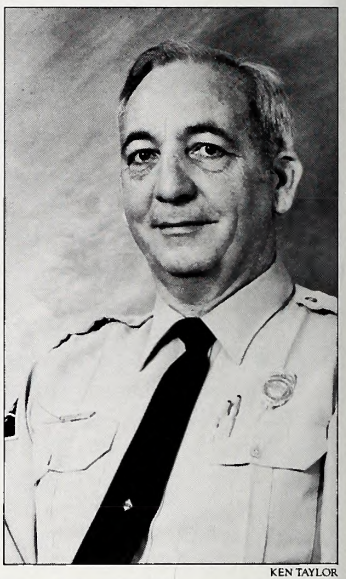
His career with the Wildlife Commission began in 1962 as an enforcement officer trainee in Wildlife District 2, which includes counties such as Beaufort, Craven and Duplin. He then worked as an officer in District 8, which includes mountain counties such as Mitchell, Caldwell and McDowell.

He worked as an area leader in District 5, an assistant supervisor for enforcement in District 9 and a supervisor in District 8.

Commission Executive Director Charles Fullwood praised both Rhyne's and Ragland's accomplishments in their field.

"We'll miss Winfield Rhyne and all his valuable contributions to this agency," Fullwood said. "But, we're happy that in his retirement he'll be able to enjoy to the fullest hunting and fishing.

"At the same time, we're pleased to have Harold Ragland at this post. He brings to it a wealth of expertise in the field and administration in the Raleigh office."



KEN TAYLOR

New Man In Charge: *Major William Harold Ragland of Clayton has been promoted to Colonel and will replace Colonel Winfield Rhyne, who recently retired, as chief of the Commission's Division of Enforcement.*

Ragland, who served three years in the U.S. Air Force, is a graduate of Moncure High School in Moncure. He enjoys hunting, fishing, gardening and collecting knives and coins.

He is married to the former Brenda Buchanan of Broadway. They have three children - Steven, William Keith and Susan Carol.

Study Seeks Answers

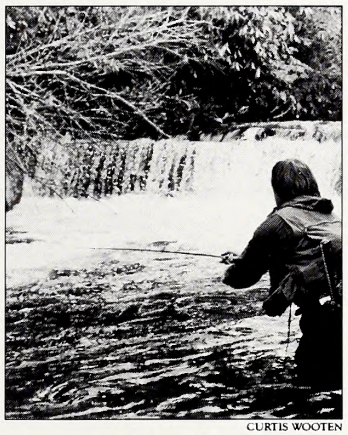
Do Half-Wild Trout Live Longer Than Hatchery Fish?

Fisheries biologists are trying to determine which fish live longer in the wild—pure domestic, hatchery-bred trout or fish with one wild parent.

"There's been a lot of interest in the past few years in using half-wild trout instead of purely domestic trout in stocking programs," said Jim Borawa, mountain region fisheries research coordinator for the N.C. Wildlife Resources Commission. "Half-wild fish are raised in hatcheries, but are cultured by collecting wild male brown trout from streams and using them to fertilize the eggs of hatchery brood fish. Many people feel that half-wild fish adapt more quickly to their natural environment, and have better survival rates over the long run."

North Carolina is conducting and coordinating a study with Virginia and Tennessee to decide whether this is true.

"We selected six streams in North Carolina, two in Tennessee, and two in Virginia for this study," said Borawa. "The North Carolina streams are Endicott Creek in Surry County, Big Sandy Creek in Wilkes County, Carroll and Thorpe's Creeks in Burke County, and Frankum and Boone's Fork Creeks in Caldwell County. The study streams range from some of the finest trout streams in the Southeast to marginal waters. The carrying capacity of each stream, which is the number of fish that the food and cover in each stream will support, was determined. In December, each of the study segments of each stream was stocked with equal numbers of domestic and half-wild brown trout. The study segments are from one-half to one mile long, and are bounded upstream by an impassible obstacle such as a waterfall, dam, or fish barrier."



CURTIS WOOTEN

Do They Or Don't They: *Many fishermen feel that half-wild brown trout are better adapted to streams than hatchery fish, a question currently being studied on six North Carolina streams.*

The fish that were stocked in December were raised in the same hatcheries at the same time. When they were stocked, the domestic fish averaged 5½ inches in length while the half-wild fish were about an inch shorter.

"There's no doubt that there are some differences between the domestic and half-wild trout," said Borawa. "The domestic fish grow quicker, and are easier to raise. The half-wild fish don't convert feed as efficiently, and they're a lot spookier. You can see that by just walking along the raceways."

Biologists are sampling each of the stream segments quarterly by electro-fishing. All of the trout collected are measured and weighed before being released unharmed. The hatchery and half-wild trout were marked by clipping different fins before stocking. Sampling will be completed next December.

"This data will show if there are any significant differences in how well these fish adapt to their streams, and whether the hatchery-bred fish are quickly caught by anglers or soon become as wary as wild fish."

Game Land No Longer Split

Conservancy Donates Gull Rock Land

The Wildlife Commission recently received a welcome donation from the North Carolina Nature Conservancy. The Conservancy donated an 800-acre tract of land to the Commission which split the Gull Rock Game Land in Hyde County. This 18,000-acre game land serves as a black bear sanctuary, and also offers good deer hunting and duck hunting on its waterfowl impoundment.

"We greatly appreciate this donation, and it will really simplify our management of this area," said Grady Barnes, section manager for research and regulations in the Commission's Division of Wildlife Management. "For example, we won't have to post boundaries between the two tracts any longer, and if we need to conduct a controlled burn on the property we don't have to manage around an in-holding."

The Wildlife Commission and the Nature Conservancy have worked together to preserve 20,000 acres of wildlife habitat since 1977. These properties include the Chowan Swamp, a 6,959 acre tract in Gates County, Southwest Ridge, a 950-acre site in Pender County, and several tracts totaling nearly 10,000 acres on the Roanoke River.

Caught In Lake James

Tiger Muskie A Terrific Fighter

CHRIS ROBINSON

Battle Of A Lifetime: *Chris Robinson of Burnsville caught a new state record tiger muskie from Lake James last August, and fought the 31-lb., 12-ounce fish for over an hour before getting it to the boat. The fish hit when he tossed a spinner bait on 8-lb. test line into cover along the rocky shore.*

State Cites 1,724 Violations

Texasgulf Appeals Air Pollution Fine

Texasgulf Chemicals Incorporated, which mines and processes phosphorus ore for fertilizer at a large complex on the Pamlico River near Aurora, recently appealed a $5.7 million fine levied by the Division of Environmental Management. The company was cited for 1,724 violations of air quality protection laws and regulations from 1983 through 1986. The fine is the largest ever levied for violations of environmental law in North Carolina.

The company was fined the following amounts:

- $4.6 million for removing the packing material from a packed-tower scrubber and continuing to operate for 1,164 days without notifying the Division of Environmental Management.
- $711,000 for operating its Diammonium Phosphate Plant No. 2 for 237 days at a rate higher than its production-rate limit of 1,800 tons per day without authorization from the Division of Environmental Management.
- $319,000 for operating its Phosphate Rock Plant No. 2 and its No. 6 Calcining Unit a total of 319 days without pressure drop gauges, which indicate whether the facility's Venturi scrubbers are working.
- $5,000 for violating the three-hour ambient air quality standard for sulfur dioxide on July 7, 1986.
- $4,000 for violating the emission control standard for fluoride on November 19, 1986.
- $2,000 for violations in late October and late November of 1986 for installing demister pads on two scrubbers without state authorization. These pads help remove fluoride particulates.

Texasgulf has been fined previously for violations of air quality standards. In 1982, the corporation was fined $37,000 for violations of standards for sulfur dioxide that occurred between 1979 and 1981. The corporation was also fined $9,000 in 1979 for violations of visible emission standards for air quality.

The current case will be presented to a hearing officer with the N.C. Office of Administrative Hearings late this year. The decision of the hearing officer will then be presented to the Environmental Management Commission. The Commission may accept or alter the hearing officer's recommendations, and Texasgulf Chemicals may either accept the Commission's action or appeal it to superior court.

You May Need Safety Course

Planning Out-of-State Hunt?

More and more hunters who travel beyond North Carolina's borders to hunt are running into a last-minute problem. Let's say you've finally had your name drawn or gotten that opportunity to hunt elk in Colorado. Then you learn that Colorado won't issue you a license until you present a valid certificate number indicating that you have successfully passed a hunter safety course. You don't have a certificate number because you've never taken such a course. What do you do?

With 34 states now requiring mandatory hunter safety courses in order to obtain a license, it can be a problem for a sportsman traveling from a state where such courses are not mandatory. North Carolina, for example, has an excellent hunter-safety program, and courses are taught in all parts of the state. It's a voluntary program, however, so many older hunters have never been enrolled.

Fortunately, enrolling in a course and getting the necessary certificate is not a big problem if you know what to do, and if you're planning an out-of-state hunt this fall or winter, now is the time to act.

"What happens each summer and fall is that hunters plan their trips and suddenly find out that they need to take our hunter safety course before they can get their out-of-state license," said Wilton Pate, hunter safety coordinator for the N.C. Wildlife Resources Commission. "If you find yourself in that situation, or if you anticipate that you'll need to take our course, we can help if you don't wait too long."

The Wildlife Resources Commission holds hunter safety education courses throughout the state each year, and chances are you can locate one near you in plenty of time. Even if time is short, you may be able to sign up for a course, although you may have to go outside your immediate area to take it.

Courses began in April, but most are held in August and September. To learn the dates, times and locations of the hunter safety education courses nearest you, write Hunter Education Courses, Division of Enforcement, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

If time is short, you can also call the toll free Wildlife Hotline (1-800-662-7137 statewide or 733-7191 in the Raleigh area). The staff duty officer has a list of all the hunter safety education courses, and will be happy to give you the date, time and location of the course nearest you.

Annual Contribution Made

Ducks Unlimited Gets Boost

ANGELA HILL

Good News All Round: *Wildlife Commission chairman Jerry Wright (right) presents Ducks Unlimited State Chairman Pete Hulsey a check for $8,010. State law requires that the Commission set aside $1 from the sale of every non-resident hunting license and non-resident six-day hunting license to be contributed to waterfowl management on the Canadian nesting grounds.*

At the same meeting, Ducks Unlimited donated 82 acres of marsh land to the Wildlife Commission. The land was originally given to Ducks Unlimited by W. B. Meredith II, and borders Currituck Sound.

Store Food Properly

Mountain Hikers Should Take Care With Black Bears

Black bears are found in 24 western and 28 eastern counties in North Carolina. While normally very shy, there are some areas—most notably the Great Smoky Mountains National Park and parts of some national forests—where bears have become accustomed to man. This can mean trouble for both man and bear unless visitors take pains to see that bears remain wild.

"Almost all of the encounters between black bears and park visitors involve food," said Stephanie Gilbert, management assistant at the Great Smoky Mountains National Park. "The most important thing to remember is that bears should not be fed—either directly or indirectly. Campers, fishermen and hikers should be sure to store food so that bears can't get at it. Once a bear learns to associate man with food and becomes a beggar bear, it is almost certainly doomed. These animals are easy targets for poachers, and are also much more likely to be struck and killed by automobiles."

Problem bears are usually live-trapped and relocated to remote areas. Repeat offenders, however, often must be destroyed.

Gilbert says that proper food storage is the key to preventing problems with bears.

"In the backcountry, visitors need to store their food very carefully," she said. "This means that you shouldn't leave even a day pack with food unattended. If you're backpacking in the park, food should be hung in sacks from trees or 'bear poles' which are provided at some campsites."

• Gilbert offers the following tips on outdoor etiquette to prevent problems with bears. When hung from trees, food sacks should be suspended at least 8 feet horizontally from any climbable portion of a tree. Also, never bury garbage. Its odor will not be masked by the soil, and bears and scavengers will dig it up. Garbage should also be hung in bags with the food and carried out. Also, don't cook in your tent—the smell of food will linger and may prompt an unwelcome nocturnal visit. After cooking, wash yourself to remove any lingering food odors.

• Fishermen should be especially careful, because fish is a favorite food of bears and its smell persists. Be sure to wash your hands well after cleaning fish, and don't clean the fish and discard the entrails anywhere near a campsite. Avoid having left-over fish (release those you don't plan to eat), and hang the remains with the garbage from a tree.

KEN TAYLOR

Treat With Respect: *Black bears are common in the mountains, and can cause problems if they become accustomed to man. Hikers and campers should be sure to store food out of reach of bears.*

• Car campers should store food in the trunk of the vehicle rather than the passenger section. This will prevent bears from trying to break into cars to retrieve a cooler.

—*Kay Scott*

Ideal For Programs

Free Films

Looking for a program for your sportsman's club or school class? The Wildlife Commission may be able to help. The Commission's Division of Conservation Education maintains a loan library of over 80 films, slide and slide-tape shows, and these are available free to organizations and schools.

"The topics covered in these programs include hunting and fishing, wildlife management, boating, environmental issues, and many others," said Ted Dossett, audio-visual coordinator for the Division of Conservation Education. "There's a program for virtually every age and interest group."

A films list, and information on obtaining these programs, may be obtained by writing FILMS, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

The Wildlife Endowment Fund Report

The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife In North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Status on February 28, 1987

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	25,165	$7,438,662.57
Lifetime Hunting License	165	33,567.72
Lifetime Fishing License	1,519	276,646.67
Lifetime Subscriptions to Wildlife in N.C.	968	119,324.13
Contributions	—	83,557.19
Fund Total		$7,951,758.28
Total Interest Earned	$1,608,614.81	

Calendar Of Events

May 1-3
Spring Wildflower and Bird Pilgrimage in Asheville. Guided wildflower and birding trips. For more information contact Dr. James Perry, Department of Biology, UNC-Asheville, Asheville, NC 28804.

May 2
14th annual Big Ivy Ramp Festival in Barnardsville.

May 2-3
Traditional Wooden Boat Show in Beaufort. Features traditional boats, exhibits, and races. For more information contact the N.C. Mariner's Museum, 315 Front St., Beaufort, NC 28516.

May 3
Haywood County Ramp Festival in Waynesville.

May 22-25
Swansboro Rotary Club's 7th annual Memorial Day Blue Water Fishing Tournament for king mackerel, billfish, dolphin, wahoo, and shark. For more information contact Garland Sewell Jr., Swansboro Rotary Club, P.O. Box 426, Swansboro, NC 28584.

May 29-31
North Carolina State Convention of Ducks Unlimited at the Ocean Dunes Hotel in Myrtle Beach, SC. Includes awards banquet, general business meeting, and other events. For more information contact David Haire, P.O. Box 2007, New Bern, NC 28560 or call 919-637-3167.

Only Minutes To Prepare
Tarragon Fish Filets Tasty

Spring and summer mean fishing to many North Carolinians, and a meal of fresh fish provides a healthy and delicious change of diet. This recipe is equally good with fish from fresh or salt water, and was provided by Jim Dean, editor.

Fish Fillets with Tarragon

4-6 fillets (flounder, sea trout, striper, largemouth bass or any non-oily white-fleshed fish)
4 tbs. butter
1-2 cloves garlic, finely chopped
4-6 green onions, finely chopped
2-3 springs fresh parsley, finely chopped (or dried chopped parsley)
1 tbs. tarragon leaves, fresh chopped (or dried chopped tarragon)
salt & pepper to taste
juice of 1 lemon

In skillet, melt butter and add garlic, onion, parsley and tarragon. Simmer lightly 1-2 minutes, but do not brown. Season fish with salt and pepper, then saute gently in butter mixture 2-4 minutes on each side depending upon thickness. Do not overcook or fish may be dry.

Place fish on warm serving dish. Remove skillet with butter mixture from stove and allow to cool for 1 minute, then add lemon juice and reheat briefly (do not boil) and pour over fish. Extra tarragon or garlic can be added to taste, and actual amounts of ingredients are not critical.

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For more information, see the opposite page.

On Top Of The World

Exhilarated hikers cross a mountain bald along the Appalachian Trail. North Carolina has many fine hiking trails from the mountains to the coast.

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Getting In Shape To Fish

by Jim Dean

I think my watershed for personal corpulence and general physical debility was reached in 1967 on a mountain trail known as Yellowbuck. I have since learned that, as trails go, this one into Harper Creek is not particularly difficult. It is a fairly steady grade for about a mile, but only the lower 200 yards could be called steep. I thought every step was steep, however, that spring day when it took me nearly 35 minutes to climb it.

What made it all the worse was that two of my companions—one a track coach at Appalachian, and the other a hyper 19-year-old—decided to race from the creek to the car carrying waders, flyrods and full vests. They made it in nine minutes. When I finally arrived in a pasty-faced cold sweat, I didn't have enough strength left to step over a root at the top of the trail and fell headlong on the ground. As much as I loved to fish, I swore then and there that I would never again see, much less fish, Harper Creek.

My companions were politely amused, but it really was no laughing matter. A dozen years of desk work, junkfood addiction and general inactivity had taken its toll, nor were trails my only nemesis. The opening of the bird-hunting season was invariably followed by four days of sore muscles. Paddling a small boat a couple of hours incurred a bout with bursitus.

I get the impression that fewer people, including sportsmen, are physical wrecks these days. The recent fitness boom may seem like a fad to some folks, but it has won a lot of devotees who are determined to make some form of exercise a permanent part of their lives. Many of the same people who have elected to exercise are also choosing their foods more carefully.

Experts aren't certain whether such habits will lengthen your life, but one fact is indisputable. Being in moderately good physical condition can greatly enhance the pleasure you gain from the activities you undertake.

If you can relate to my embarassing experience on Yellowbuck trail, it's time you gave more than a passing thought to whipping your flabby body into some semblance of condition.

No doubt, the mere thought of undertaking a regular regimen of fitness is agonizing, but if you can force yourself through the first two weeks, you're likely to actually look forward to exercising. It doesn't take much effort to get started, and indeed, you should begin modestly. The first step should be a physical checkup to make sure all your parts are still in working order.

Jogging is one of the most popular forms of conditioning, but there is an increased risk of knee injury. Walking is a safer way to start. Aerobic dancing—some call it "boogie 'til you drop"—is another good way to get in shape, and it's relatively safe if you start slowly and get into a class that emphasizes routines that help avoid knee injury.

Court sports such as tennis or racquetball are also excellent, and many people who hate to exercise find the competition so much fun that it takes the sting out of the hard work. Walking, jogging, aerobics or playing a sport will also combine nicely with 30-minute workouts every other day. The various types of exercise machines widely available in fitness clubs are good muscle toners, especially combined with a ride on a stationary bicycle. You're also less likely to injure yourself on a machine than by using free weights (bar bells and the like used by serious body builders).

The best advice is to start slowly. Walk a mile or less the first day, use very light weights, and don't push yourself. After all, you're embarking on a lifetime venture after what may have been years of dissipation, and you can't expect miracles overnight. Within a few weeks, you'll be amazed at how good you feel, and you'll be able to extend your workouts.

If you're an outdoorsman, you'll also find that you're enjoying your sport more than ever. Several years ago I began a modest fitness program, and although I am in no danger of being mistaken for an athlete, it has definitely paid off. Last summer, as my son and I cruised easily up a steep, two-and-a-half-mile trail, we passed two trout fishermen. Their tongues were hanging out so far they were picking up gravel, and their faces were as white as commode lids.

"It will be," one gasped, "a cold day you know where before I fish that stream again."

I knew exactly how he felt, but I hope it remains only a memory. What sense does it make to take superb care of your hunting and fishing gear if you're in no shape to use it?

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Cover *Water glitters in the late afternoon sun silhouetting a pair of anglers on one of North Carolina's municipal water supply lakes. The fishing is often good in these carefully managed lakes. Photograph by Ken Taylor.*

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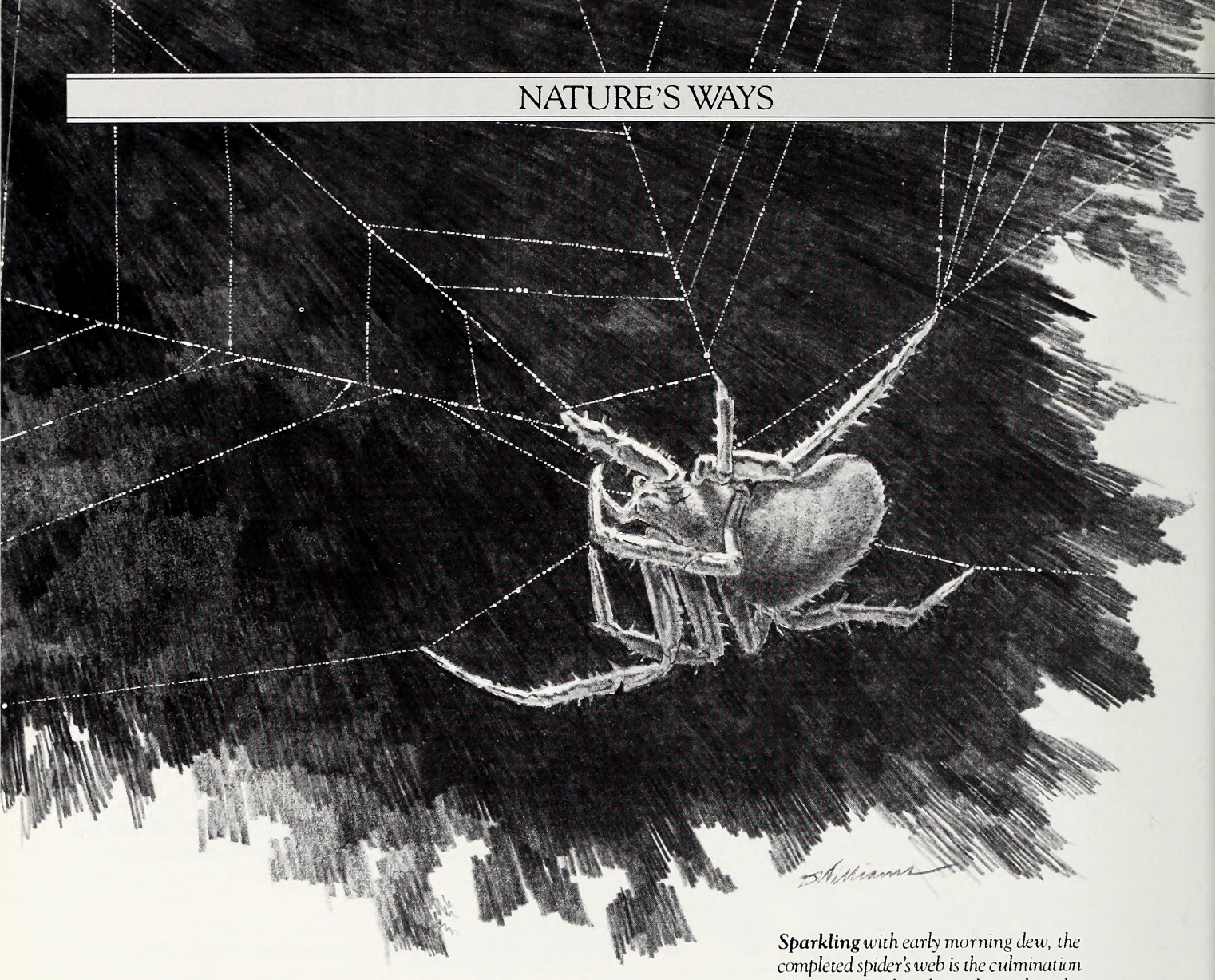


***Sparkling** with early morning dew, the completed spider's web is the culmination of many steps that the spider took with unerring instinct. Each species constructs a web characteristic of its species, and different species within the same spider family produce similar webs.*

How To Build A Spider's Web

written by Lawrence S. Earley/illustrated by David Williams

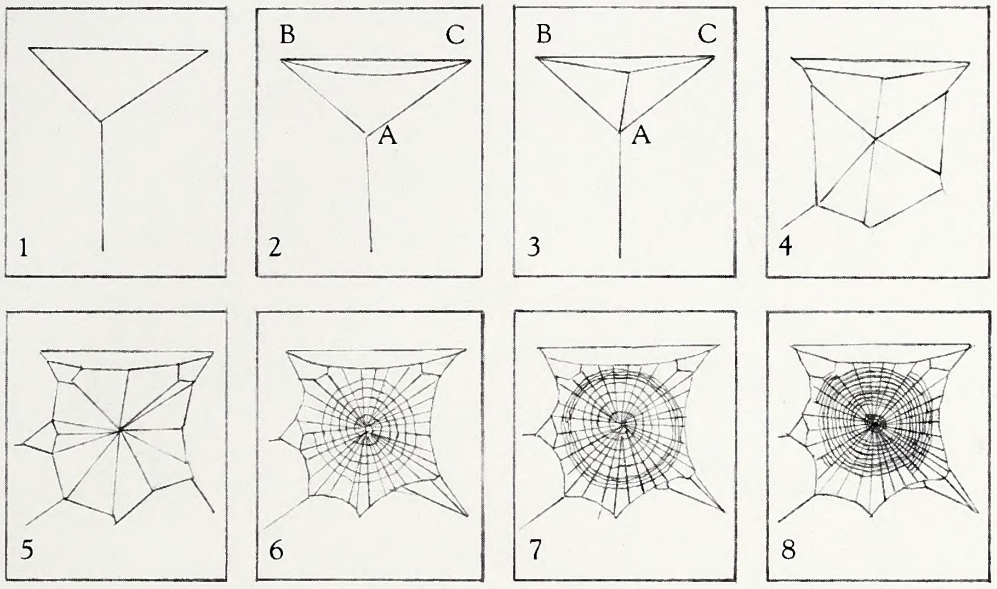
Building a spider's web is very easy. You catch a spider, place it on a bush or flower stalk in your back yard, and watch it go. That's the nice thing about being a contractor — you don't do any of the work yourself.

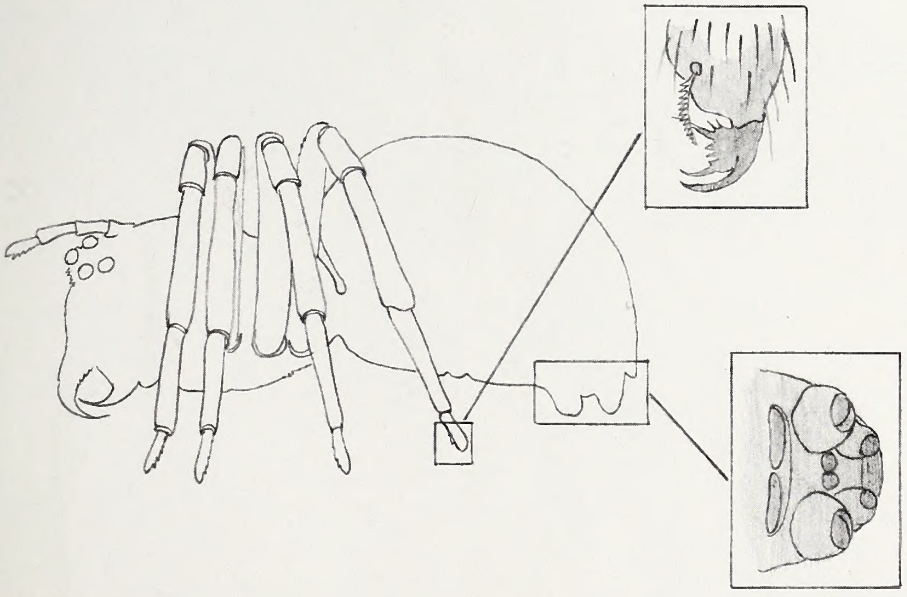
If the spider you've employed is an argiope, the common garden spider, you'll get an orb web that will glisten with morning dew in midsummer or early fall and astonish you with its symmetrical beauty. Your argiope should come equipped with the basic tools of the trade — silk-producing glands, spigots and spinnerets. Actually you won't be able to see any of these tools, unless you hold the spider by its squirming legs and peer at its rear end with a magnifying glass. But such treatment might discourage the spider causing it to walk off the job. Instead, look at the illustration on these pages for a basic inventory of spider equipment. There are even instructions on how to proceed with the web, just in case your spider has forgotten.

Meanwhile, here are some things you ought to know about your new web:

• A web is made of spider's "silk" which is a fibrous protein produced by a number of silk glands within the spider's abdomen. Scientists have identified seven types of these silk-making glands, although a particular species of spider may not have them all. The liquid silk produced by these glands flows through a number of tiny external appendages appropriately

The orb web *is woven on a triangular frame (figure 1). Crawling from* **C** *to* **B** *(figure 2), the spider spins a loose line. After attaching a new thread to the middle of this line, it crawls to* **A** *and pulls the line taut (figure 3). Attaching other foundation lines to points in the vicinity, the spider creates a framework (figure 4) to which it will add radii (figure 5). After all the radii are added, the spider weaves a wide spiral band that will serve as a temporary scaffolding for its other labors (figure 6). Beginning from the outer edges and moving toward the hub, the spider then lays down a sticky spiral line, pulling it taut between each radius and removing the temporary scaffolding as it goes (figure 7). The finished web is a insect trap of the first order.*





Silk glands *in the spider's abdomen produce liquid silk (the silkworm of a moth spins its silken thread by glands in its head) which flows into the spinnerets, external organs at the rear of the spider's stomach. Six of these organs are standard, and each may contain up to five spigots through which the silk actually emerges. The spider uses claws on rear legs to manipulate the silk from the spinnerets.*

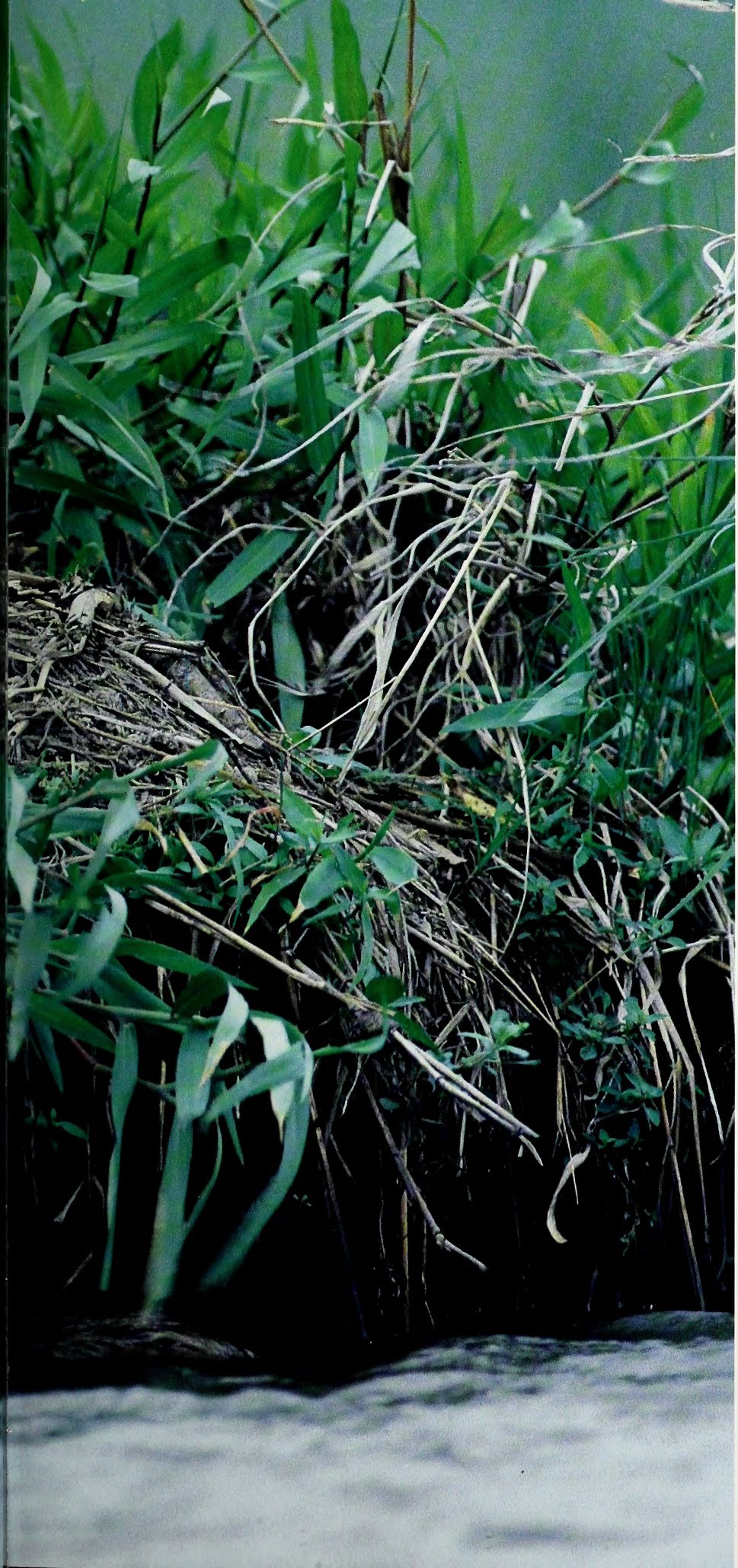
called spigots which are found on slightly larger, flexible organs called spinnerets located at the rear of the spider's body. The silk must be pulled from the spinneret. Constructing its web, the spider draws out its "line" using special toothed claws on its legs.

• Although the silk is in liquid form within the spider, it emerges as the hardened thread that is so familiar to us. The hardening processs is somewhat mysterious, but scientists think that it takes place when the spider pulls the silk from the spigot.

• The finest spider silk measures about one millionth of an inch, and its tensile strength is greater than that of steel. Yet most likely, the silk you see is a composite thread formed of the silk from several glands. Each of the spider's silk glands produces a different kind of silk, and the spider instinctively combines them to form what's needed. The swathing silk used to wrap prey is not the same as the silk used to wrap up egg sacs. The argiope's web consists of several kinds of silk—a dry silk, used for scaffolding (see illustration), and a sticky silk that ensnares prey.

• Spiders will spin abnormal webs after being given certain drugs, and the webs themselves are tell-tale of the drug administered. Spiders have been used extensively to evaluate drugs for treating mental illness at Dorothea Dix Hospital in Raleigh.

One thing more: if your spider takes any longer than an hour to weave its web, fire it on the spot. The average argiope ought to be able to complete its business within an hour. After that it's only dawdling.



THE NUTRIA FINDS A NOOK

This large semi-aquatic rodent is native to South America, but it's found a home in eastern North Carolina and many other parts of the world.

by Mark Taylor
photography by Larry Ditto

The picture in front of the tent at the county fair was too much for a 12 year old to resist. Dead soldiers lay sprawled on the jungle floor while rats as big as barrels gnawed at their jugular veins. "See the man-eating rats of Vietnam," the lettering read. "The world's most vicious rodents, eating wounded soldiers while they're still alive...." Gary Philpott and I stood there, jingling our last, loose quarters in our pockets.

"Gee," I said with reverence. "Man-eating rats."

Gary quickly said, "Let's go."

We paid our last 50 cents to the carnival barker, and entered the tent.

Inside was a small cage which held a large, brown creature contentedly munching a carrot. We'd never seen anything like it in our rambles through the nearby swamps and woods, but we knew one thing—this was no man-eating rat from Vietnam.

"Looks like a beaver," said Gary. "It's about the right size."

"Tail's wrong," I said. "Beavers have broad, flat tails. This thing has a tail like a muskrat. Maybe it's a giant muskrat."

"A man-eating muskrat," Gary grinned.

***Nutria are native** to South America, but were introduced to this country in the 1930s. The animals were first released by private interests in North Carolina in 1941.*

The Nutria Finds A Nook

We left the tent and expressed our outrage to the carnival barker. "We shoulda seen the human blockhead—he drives nails into his ears."

It wasn't until years later that I realized we'd seen a nutria, a large aquatic rodent that lives in much of the South and West. While nutria may lack the glamour of man-eating rats, they are interesting animals in their own right. Introduced to this country from South America, they resemble a cross between a beaver and a muskrat yet are most closely related to the porcupine. In all probability, they are North Carolina's least understood furbearer.

Nutria, also called coypu or South American beaver, are native to Argentina, Chile, and other temperate regions of South America. The name means "otter" in Spanish. These large, semi-aquatic rodents live along the shores of rivers and in marshes and feed entirely upon aquatic grasses, weeds, and other vegetation. The animals usually weigh 7 to 12 pounds, although a large male may reach 25 pounds. They have a long, round tail, and four large, orange-reddish teeth.

Early in this century, nutria were imported to Europe and Russia for breeding in fur ranches. In the 1930s, interest in nutria ranching peaked in the United States. The animals were soon imported into the Pacific Northwest and much of the Southeast. These attempts at fur ranching were, for the most part, short-lived.

"Fur ranching for nutria never really caught on because there was no market for the pelts," said Randy Wilson, furbearer project leader for the N.C. Wildlife Resources Commission. "The pelts are coarse and of low value, and fur ranches found that the animals were difficult to breed and that the pelts produced by nutria in captivity were inferior to wild nutria. Nevertheless, importers promoted nutria for fur ranches and also as a means of controlling swamp vegetation. It was basically a 'get-rich-quick scheme,' and the only people who ever made any money from nutria were the importers. However, the nutria that had been released by farmers, hunters and trappers—and those that escaped from fur farms—established wild populations."

The first nutria introduced to North Carolina were released by the Gooseville Gunning Club of Hatteras Village near Buxton Woods in 1941. In the early 1950s, the animals were also privately released near Garysburg in Northampton County and on Bray Island in northern Currituck Sound.

"Today, nutria are found along the Outer Banks and in the coastal counties from Virginia south to Carteret County," said Wilson. "They're also found inland in Northampton, Nash, Edgecombe, Bertie and Martin counties. They appear to be expanding their range up our coastal rivers."

The expected benefits of nutria never materialized, and farmers quickly found that the imports could be pests. Like muskrats, nutria will burrow into river banks, earthen dams and dikes. Their dens are larger, however, and will sometimes cause these structures to collapse or wash out from the pressure of a heavy rain.

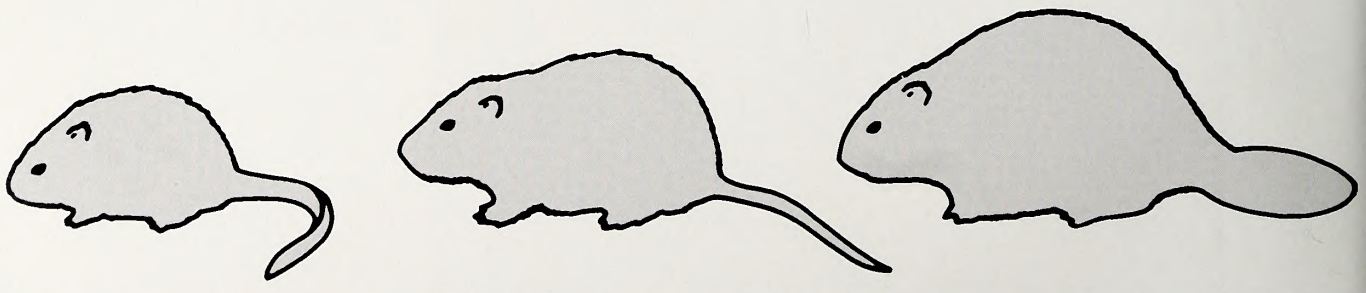
"This can cause farmers some real problems, although it's not widespread," said Wilson. "It's more of a problem in the Deep South. In Louisiana, for example, nutria often burrow into the dikes surrounding rice fields which are lower than the adjacent canals. Of course, nutria will also eat vegetation from gardens and fields. The most effective control for them is trapping."

Some of the densest nutria populations are found along the Outer Banks.

"We were doing a pheasant survey on Cape Lookout a few years ago, and were really surprised at the numbers of nutria we encountered," Wilson recalled. "We were using dogs to flush pheasants, and were recording the numbers of birds we kicked up. Well, we flushed a lot more nutria than pheasant. Every hundred yards or so we'd come to an 'eat-out,' which is a big patch of ground where the nutria had eaten all the vegetation. It looked just like it had been mowed. They had actually eaten the sea oats right down to the high tide mark on the sea side of the dune."

***An albino nutria** is an uncommon sight. A pair of these animals was found last summer at the Lake Mattamuskeet National Wildlife Refuge.*

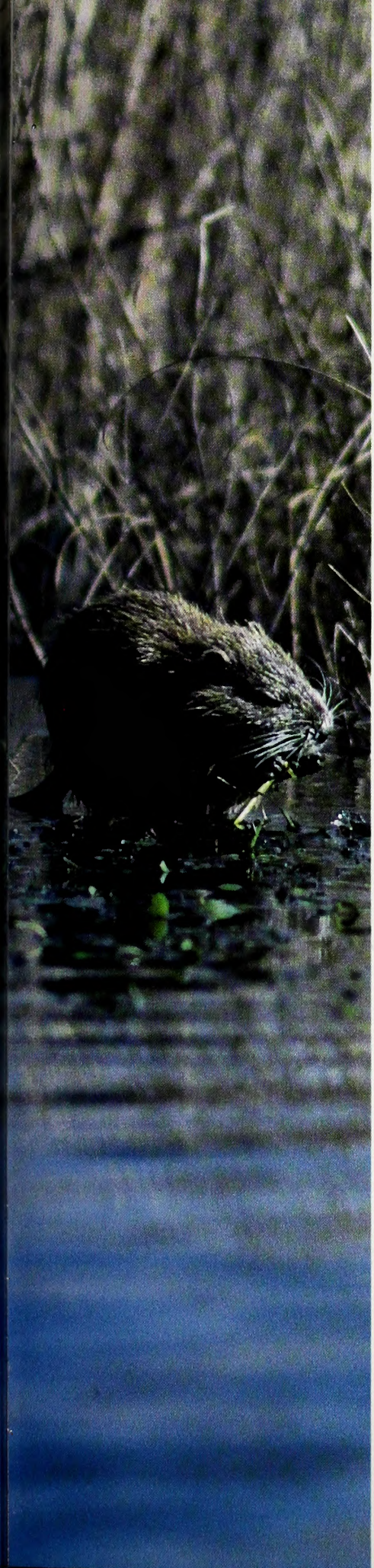
Three North Carolina Marsh Dwellers



***Native muskrat** are similar to nutria but smaller, weighing only two to four pounds. Muskrats have rich, dark fur and a long, scaly tail.*

***Nutria** were imported to this country from South America, and weigh a hefty 15 to 20 pounds. They have grayish-brown fur and a long, round tail with little hair.*

***Beavers** are the largest marsh dwellers, and weigh from 30 to 60 pounds. These native rodents have dark, dense fur and a distinctively flattened paddle-shaped tail.*



The Nutria Finds A Nook

The nutria's eating habits don't endear it to many coastal residents. The animals often leave broad swaths of marsh looking as if they were mowed with a dull scythe. However, the situation may not be as bad as it appears. Unlike muskrats, which burrow under the soil and eat the roots of aquatic plants, nutria shear them off at the surface. The resultant eat-outs may encourage the growth of more succulent plants favored by waterfowl, muskrats and other animals. Research done by Robert Milne of N.C. State University on the Cape Hatteras National Seashore in the early 1960s suggests that these eat-outs set back succession in the marsh much as small patch cuts provide browse for wildlife in old forests.

"Local trappers say that nutria began showing up in Hyde County in the mid-1960s, and they've never caused any real problems here at the Lake Mattamuskeet National Wildlife Refuge," said Larry Ditto, refuge manager. "In fact, it's desirable to have some openings in the marsh.

"We even had a pair of albino nutria here last summer, and they were quite a drawing card. They're interesting animals. Not many people realize this, for example, but the mammary glands of nutria are located high on both sides of their bodies instead of on their bellies. Some biologists believe this is an adaptation that allows them to nurse their young in the water."

The majority of nutria found in North Carolina, however, inhabit the marshes of Currituck Sound. Mr. J. J. Flora of Moyock runs J. J. Flora and Company, a fur shed that buys most of the nutria found in the region. He is one of the few fur dealers who handle the animals.

"I've been buying and selling nutria for about 20 years," Flora said. "We buy about 1,500 pelts per year. There's never been much of a market for nutria, though, for several reasons. One is the quality of the fur—it's a coarse pelt that will usually be dyed. In fact, the prime fur is found on their bellies, unlike most furbearers, because of the location of the mammary glands. Nutria are also difficult to process. The hide is thin and tears easily, and the flesh and bones also tend to come apart and rip the hide during skinning.

"Another problem is that when nutria populations build up to high levels, they begin fighting a lot and this damages the hides. I've seen pelts with 50 tooth scars on the back, and naturally these aren't very desirable. Since we deal in small volumes of fur, the price also tends to be low. The fur industry demands large quantities of fur that is uniformly processed and of high quality. Consequently, nutria only bring the trapper about $1.50 to $2 per animal. Even though they're easy to trap—they're dumb and will walk right into the simplest set—it's hardly worth the bother."

Many trappers believe that nutria compete with the more highly regarded muskrat, and that populations of this native species have been hurt by this introduction. The results, however, are inconclusive.

"They do feed on the same foods, and nutria will use abandoned muskrat dens and will often sleep on top of muskrat houses and flatten them out," said Wilson. "This certainly doesn't do the muskrats any good, but it's hard to say what impact it's having. And although they both feed on aquatic plants, some people feel that the eat-outs left by nutria favor the growth of smaller, succulent plants preferred by muskrats and other wildlife."

Ditto feels the same way about the nutria population around Lake Mattamuskeet. "The local trappers say that nutria have hurt muskrat populations through competition for food and habitat," he said. "We haven't seen any concrete evidence of this since I came here four years ago. Muskrat populations are so cyclical anyway that it's difficult to determine."

The nutria population in North Carolina probably peaked in the mid-1970s. The population was nearly wiped out, however, by the severe winter of 1977-78, when Albemarle and Currituck sounds froze.

"We received reports from trappers of piles of dead nutria, and many of the animals found the following season were missing toes and had lost portions of their tails to frostbite," said Wilson. "Nutria which live in coastal marshes are especially susceptible to cold because they don't live in dens. They generally build 'day beds,' which are floating mats of grass, and sleep in them exposed to the weather."

Since that time, Flora notes that the population has slowly recovered.

"That bad freeze just about wiped out the nutria, but they're fairly prolific and slowly built back up. Nutria breed year-round, and they're just about back to their former levels. In fact, I think next year we'll see more of them around than we've had in the last 10 years." ⊠

***Strictly vegetarian**, nutria often eat enough to open "holes" in a marsh. However, this may encourage the growth of more succulent plants favored by waterfowl and muskrat.*

Mister Simmons' Wonderful Boat

When coastal fishermen wanted a seaworthy boat that would handle the ever-changing inshore waters, T.N. Simmons built his now famous Sea-Skiff.

by David Carnell

Mason Inlet between Shell Island and Figure Eight Island is a narrow, shoal-prone gut, and not always where it was when you last used it. Just offshore there is an almost continuous line of breakers, but well off to port there is a spot that breaks infrequently. I push the throttle forward just enough to plane and the 29-year-old, 18-foot lapstrake boat with the upswept bow and the sharply raked transom skims across the water towards that possible hole in the breakers. Just as we reach the breaker line, a wave forms directly ahead, cresting just before it meets the bow of the little boat. No problem. The boat swoops up and rides over the foaming water with a saucy flip of its stern.

Out in the ocean now, we head "down east" parallel to the beach and run about 20 mph on a smooth plane the four miles to Rich Inlet. We can go faster, but then the boat drops off the crests and slams the troughs; why be uncomfortable on such a beautiful day? At Rich the sea is confused and breaking across the inlet as the tide flows out against the Southeast breeze. Cut the throttle back until a wave goes under and then speed up to ride its back as it breaks. That gets us most of the way in, but a wave rises astern, breaks, and rolls down on us. Take it a little off to one side and the stern rises on top of it. Hang on as the boat slides off, straighten up, and scoot into the channel.

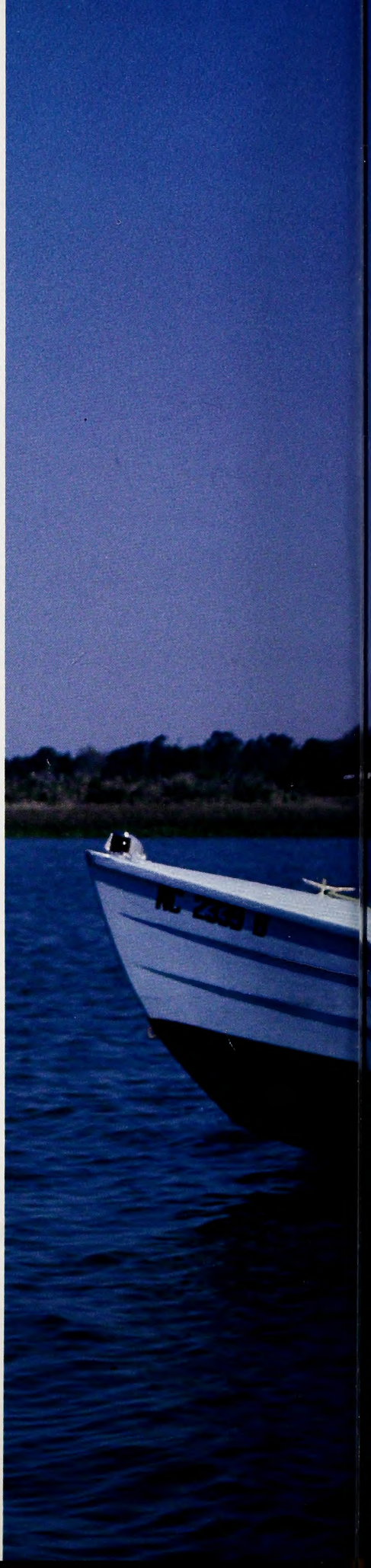
In the quiet sound we zip along at 30-plus mph up Nixon Channel to the Atlantic Intracoastal Waterway and slip quietly up Pages Creek and home. This is but one of hundreds of ocean trips this Simmons Sea-Skiff has made.

The Simmons Sea-Skiff is unique among traditional small craft. T. N. Simmons was not a boatbuilder by profession, and never set out to be one. His reputation as an outstanding woodworker combined with circumstances to make him the creator of a legendary boat that made ocean sportfishing available to the average person. Other traditional small craft such as Albemarle shad boats and Cape Cod catboats, began as the successful design of an individual builder copied by other builders. In that same tradition, the Simmons Sea-Skiff was the work of one man, his son, and a helper or two.

T.N. SIMMONS FAMILY

***T.N. Simmons** of Myrtle Grove Sound built his first boat (above) in 1932. He developed the popular Simmons Sea Skiff (right) shortly after World War II.*

T. N. Simmons was born on Myrtle Grove Sound in 1908 and lived there all his life except for a few teenage years at Ocean View, Virginia, near the mouth of the Chesapeake Bay. Like his father, he was a carpenter. He built his first boat in 1932 to use in the sound near his home. The next year, he was hired in the construction force building the Ethyl-Dow plant to extract bromine from sea water at Kure Beach. He stayed on with the plant maintenance force until 1943 when he applied to the wartime shipyard at Wilmington for a job as a patternmaker.



ELEANOR CARNELL

T.N. SIMMONS FAMILY

***The U.S. Army Corps of Engineers** used a customized Simmons Sea Skiff as a "stake boat" for surveying. An interior well allowed surveyors to sink stakes straight through the center of the boat, and the framework kept the stakes straight.*

"If it was made of wood, I could make what you wanted," he said about his pattern-making experience. The day the war ended, he packed his tools at the shipyard and went back to his shop beside his house on Myrtle Grove Sound Road.

He intended to make cabinets, but, for some reason, built a 12-foot flat-bottomed skiff that he set in front of the shop. A passerby who fished lakes in the Piedmont bought it and took it home, initiating a series of orders. No pictures of these boats have been found, but from Simmons' description those skiffs must have been similar to that first boat. The Sea-Skiff was yet to come.

Norman Piner, a neighbor on Myrtle Grove Sound, told me how Simmons built the first Sea-Skiff for him. Around 1946, Piner and friends were using a haul seine to catch Virginia mullet migrating down the coast in the fall. Their boat was a heavy, double-ended surfboat. Launched into the surf, it plowed through the waves which often half-filled it. After they had circled the school and were returning to the beach, the boat would run onto the beach and a following sea would commonly break over the stern and swamp it. Piner went to Simmons and asked him to build a different boat. They looked at the hulk of a New England dory—pointed at both ends, low in the middle with both ends swept up, and with lapstrake construction. Piner asked for a boat built like the dory from the bow back to amidships and then kept wide back to a high stern. Simmons measured the dory, went back to his shop and built the boat from juniper boards Piner got for him by cutting the trees in a swamp, hauling the logs out with a mule, and carrying them to a local sawmill.

"The boat was a beauty," Piner told me. "It was light. When you launched it into a wave, it rode right up over. When we came back into the beach and left it to haul the seine, it just danced up and down like a feather in the waves at the edge of the beach."

Simmons was not a conventional boat-builder. Instead of setting up the skeleton of stem, keel, stern, and ribs and covering it with planking, he built as the Viking boat-builders did a thousand years earlier. He set up the stem, keel, and transom at the length and bottom curve he wanted. The shape of the boat was set largely by the curve that Simmons cut in the bottom edges of the first plank on each side. Each higher side plank, or strake, lapped over the one below it—thus, lapstrake planking. The finished boat has the curved stem, the high bow, and the flared lapstrake side of the New England dory.

The beach boat's flat bottom was tucked up at the stern for easy rowing. Simmons added outboard motor power by building a well in the boat. This maintained the high stern's protection from following seas, and made the motor accessible for repairs. Kenneth Sprunt, owner of Orton Plantation, saw one of these boats in 1947 and had Simmons build him one with the bottom carried flat all the way aft for better performance under power. When Julien Taylor of Town Creek had Simmons change the flat bottom to a shallow vee, the final Simmons Sea-Skiff hull form was born.

In 1951, major manufacturers brought out the first 25-horsepower outboards. These pushed the light Sea-Skiffs at over 30 mph, and fishermen took them 50 miles and further offshore to the Gulf Stream. The ability to make tight turns at high speed also made the Simmons ideal for towing water skiers.

When T. N. Simmons Jr. graduated from high school in 1954, he joined his father's growing business. By 1955, good juniper boards were scarce and Simmons switched to fir marine plywood for the planking and used mahogany for the framing and trim. The boats were most numerous in south-eastern North Carolina, but were sold to buyers all along the Atlantic and Gulf coasts, and even showed up in California. Government agencies like the U.S. Army Corps of Engineers bought boats from Simmons, including a specially designed stake boat with another well in the middle of the boat so that a stake could be driven into the sandy or muddy bottom and position the boat as a survey marker. As motors grew larger and larger the boats became wider and higher to handle the power. This flattened the pronounced sheer (the curve of the top edge of the boat) which Piner calls "banana-shaped." By the mid-1960s the original shop building was complemented by a paint shop, storage sheds, and a showroom. Simmons never counted all the boats his firm made, but there must have been as least 1,000 by 1972. That year, young Simmons drowned in an accident on one of the boats and Simmons built no more boats. "We had 19 good years

T.N. SIMMONS FAMILY

***Simmons built** this 20-foot sea skiff in the late 1960s. The upswept bow, flared sides, and high stern made the boats exceptionally seaworthy.*

Sea-Skiff Lives

It seems likely that the Simmons Sea-Skiff will survive at least among amateur boat builders who have an interest in history and an appreciation for superior design.

The New Hanover County Museum Foundation (814 Market St., Wilmington, N.C. 28401) is offering plans and building directions for the 18-foot model based on a full scale lofting of a 1958 boat. A full-size stem pattern, four sheets of plans, building directions, and photographs of construction details cost $30. Plans have been sold all over the country and abroad, and some boats have already been built from them. The New Hanover County Museum is also building a Simmons collection and would especially like to get photographs of the boats.

working together," Simmons said of his son.

Piner, who had the first of the Sea-Skiffs, showed me the last boat Simmons finished, a 20-foot model in nearly new condition. Simmons tried to keep his boats inexpensive, while giving good quality. The joints in the Sea-Skiff I still have are too tight for a thin knife blade to enter and no glue or sealant was used in the original construction. He improved the design from the feedback of his customers' experiences and he was amenable to making changes and adding special features. He didn't like to build the same boat over and over and never really wanted a "factory." Indeed, he turned down attempts to get him to bid on large orders for the Coast Guard or go into large-scale production.

Simmons never made or used plans for his boats, but he had patterns, jigs, and setups which turned out boats with a minimum number of man-hours of work. Because he built efficiently and sold directly to his customers, he had low overhead costs. The boats were real bargains—high quality at low cost. Through the years, the price of an 18-ft. Simmons Sea-Skiff was about the same as the price of a 25-horsepower outboard. In 1972, a painted 18 footer was $750; a 25-horsepower electric-start motor, $725. At that time, commercial fiberglass boats the same size sold through dealers at an average price of $1,700, but the difference was not wood versus fiberglass. It was a very efficient individual craftsman selling his product directly to the user based on its word-of-mouth reputation versus modern manufacturing and merchandising operations.

Simmons also made furniture for his home and those of his daughter and granddaughters. He made everything from picture frames to bedroom furniture and a beautiful grandfather clock. During the two years I knew him, before his death on November 16, 1986, he often complained, "I don't have any 'horsepower' anymore."

Maybe not, but he will be long remembered for his boats—completely functional, beautiful to see, and best-known for their seaworthiness and high-spirited performance. ⊠

Aphids Up Close

Feasting on plant juices, aphids are the bane of gardeners, but these common insects can be fascinating when viewed through a closeup lens.

photograph by Norman Hallock

Backyard gardeners know aphids as one of the most destructive pests in their gardens. The tiny sapsuckers infest one out of every four known plant species and can cause an extraordinary amount of damage to a rose bush or a bean crop.

And yet the reproductive life of an aphid is truly one of the marvels of nature, with enough unusual features to inspire awe in even the most inveterate aphid-hater. Norman Hallock trained his camera on his rose bush one afternoon and captured one of the most unique of these features — an aphid giving birth to live young. Most other insect young hatch from eggs fertilized by a male, but aphid females produce prodigious numbers of young without fertilization, a phenomenon known as parthenogenesis (after two Greek words meaning "virgin birth").

So eager are aphids to produce young that only females are born during the breeding season (usually in the cooler days of spring), some winged, some wingless. Indeed, the new-born aphid seen in the photograph likely has a number of embryos already developing within her. A dozen or more aphid generations may be born by the hot days of summer, when aphids tend to aestivate (become torpid), and since a single female gives birth to as many as 150 young, aphids increase their populations at an unbelievable rate. Ask any gardener.

Suddenly, the long nights of autumn trigger the birth of sexual aphid forms. Winged males are produced that mate with wingless females. Eggs are laid, but hatching is delayed until the following spring. Why does the aphid reproduce both ways? Since the "egg generation" is usually the last produced before winter, biologists believe sexual reproduction is an adaptation to cold climates — a means for the species to protect a new generation until spring.

But sexual reproduction has other advantages to the species. According to one explanation, because the offspring of a parthenogenetic mother are essentially clones — each has the exact genetic inheritance of the mother — they seek out identical habitats and this increases competition. Sexually produced offspring, however, inherit the genes of both father and mother and thus differ from each other slightly. Some of these offspring may be fitted for a slightly different habitat, thus winning a little more "elbow room" for the species.

The thought of all those well-adapted aphids is enough to freeze the blood of most gardeners. But plants aren't entirely defenseless. Hairs prevent the little creature from sinking its sucker into the plant, and plants even employ chemicals to discourage the aphid. Besides, without aphids, what would gardeners have to worry about? ☒

— Lawrence S. Earley

The Urban Angler

Some of the best fishing in the state is found in the smaller, well-managed municipal lakes of the Piedmont, and most Carolinians won't have to travel far to enjoy it.

by Roger Jones
photography by Jim Dean

If you've been fishing more and enjoying it less in recent years, you're not alone. You're definitely not alone. Indeed, the large impoundments across North Carolina are getting a lot of traffic from anglers, water skiers and other water enthusiasts. Maybe it's time you stopped "thinking big." There are lots of smaller bodies of water that offer good fishing, and many of them are in the Piedmont where they're convenient.

I'm talking mostly about municipal water supply reservoirs frequently referred to as city lakes. Most range from about 75 to 1,500 acres, and they offer fair to excellent fishing for a variety of species: largemouth bass, striped bass hybrids, crappie, bream, channel catfish, pickerel, carp and bullhead catfish.

Over the years, biologists with the N.C. Wildlife Resources Commission have surveyed fish populations in various city lakes using a variety of sampling techniques and are able to learn which lakes have good fish populations. At the same time, anglers have been conducting their own surveys, but obviously using different gear. Both techniques can provide useful information about fish populations. I interviewed over 20 anglers to get tips on their fishing techniques. Also, from Commission survey information, discussions with fellow biologists and angler interviews, I was able to identify 14 lakes in eight Piedmont counties and rank the better fishing lakes for four major fish species. (See table).

Largemouth Bass Lakes

Because the largemouth bass is the most popular freshwater sportfish in North Carolina, I figured it would be a simple matter to ferret out the best techniques for catching bass in city lakes. Boy was I wrong! Have you ever asked a bass fisherman with a nice stringer of bass where and how he caught them? Talk about tight-lipped. Even on his deathbed, he may not relinquish such information. Even so, I managed to get some good tips from those anglers who weren't so secretive.

Milton Weisner fishes Lake Thom-A-Lex, an 800-acre reservoir near Lexington, for largemouth bass. He uses spinner baits and jigs from April through June, but as the weather warms in July, he switches to a blue or black plastic worm. Milton prefers to fish on overcast days when there is a slight ripple on the water. Points with stumps in 4 feet to 8 feet of water have been very productive for him. Milton uses spin-casting equipment with 12- to 14-pound test line. Thom-A-Lex has an 18-inch minimum size limit for bass and Milton considers bass fishing good to excellent there.

Another productive city lake for bass is Lake Michie (540 acres) near Durham. Ronnie Wheeler fishes the lake throughout the year, but his favorite time is during early mornings in May and June. He fishes with a plastic worm (Texas-style rig) using a bait-casting reel with 12- to 17-pound test line. He prefers the heavier line when fishing murky water conditions and because of Lake Michie's abundant structure. Ronnie says the best places to catch bass in Lake Michie are in downed trees and along rock drop-offs in depths ranging from 3 to 15 feet. Ronnie takes his time, and fishes the plastic worms slowly.

Cane Creek Reservoir near Monroe in Union County is a 350-acre lake that is considered a good bet for bass. Bob Glendy fishes the lake year-round but prefers the months of April, May, September and October. Bob uses spinnerbaits in the shallows during the spring, and has found them to be more productive when the water is murky. During the fall, Bob fishes mostly crank baits such as the Bagley small fry (black with silver foil). He has had a lot of success fishing creek junctions in the upper end of the reservoir. Bob suggests using a depth finder to locate the creeks and submerged structure. Cane Creek has a special 18-inch size limit with a two fish exemption in the creel of eight bass.

Buddy Allen, an avid bass fisherman who fishes Greensboro's Lake Brandt (800 acres), prefers to fish after the bass have spawned. Buddy usually starts fishing mid to late May with Bagley baits (DB-1 or DB-2), buzz baits and Lunker Lures in water up to 7 or 8 feet deep. Lily pads and grass beds have been productive spots for him in Lake Brandt. As the weather gets warmer and fishing slows, Buddy switches to black plastic worms. He prefers to fish worms along drop-offs, creek channels and stumps.

***Although many** of the smaller municipal lakes may be long past their boom years, most are carefully managed, and offer decent fishing for largemouth bass and other species.*

Big Game Tag Report Number 11

...a summary of North Carolina's big game harvest for 1986-87 as reported by hunters to Wildlife Cooperator Agents

Why should a hunter go out of his way to tag and report the turkey gobbler he just shot? How many deer were harvested during the season here in North Carolina? Was the total deer harvest for this period greater or less than this figure for last season? How is this information used? These are questions that often surface during discussions of North Carolina's big game tagging system. The big game tagging system is a reporting procedure which requires that all wild turkey, boar, bear and deer which are harvested by hunters here in the state be tagged at the site of harvest and that certain information be reported to any one of approximately 1,500 Wildlife Cooperator Agents for later collection by the Wildlife Resources Commission. This procedure became mandatory in the fall of 1976. Successful game management is based on many factors and individual pieces of information, including in this case, big game harvest figures.

The more a game manager knows about population trends and numbers, the easier it is for him to make decisions affecting seasons, bag limits and other regulatory matters. Sound big game management must be the result of the combined efforts of sportsmen and the staff of the Wildlife Commission. While the figures in this report represent the reported harvest and may vary from the actual harvest, they are the best such figures available at this time. Please do your share to see that future reports of this nature are as complete as possible by tagging and reporting your big game harvests and by encouraging your fellow sportsmen to do the same.

If you have questions about the procedures or this report, please contact the Division of Wildlife Management, North Carolina Wildlife Resources Commission, 512 N. Salisbury Street, Archdale Building, Raleigh, North Carolina 27611.

1986-87 Reported Black Bear Harvest

County	Male	Female	Sex Unk.	Total	Game Land	Other Land	Unk. Land	Rifle	Shot-gun	Hand-gun	Gun Unk. Or Other
Avery	5	2		7	6	1		5	1	1	
Bladen	11	6		17	4	12	1	11	6		
Brunswick	9	1		10		9	1	5	3	2	
Buncombe	8	8		16	10	6		14	2		
Burke	5			5	5			5			
Caldwell	8	2		10	5	5		9			1
Carteret	13	3	1	17	3	12	2	13	2		2
Cherokee	15	10		25	24		1	23	2		
Clay	15	8		23	21	1	1	21	1	1	
Columbus	5	1	1	7		7		3	3	1	
Duplin	2	1		3		1	2	2	1		
Graham	18	9		27	24	3		25	2		
Haywood	20	13		33	22	9	2	31	1		1
Henderson	1	1		2		2		2			
Hyde	38	16		54		53	1	46	6	1	1
Jackson	10	1		11	6	1	4	7	3		1
Jones	13	6		19	2	17		17	2		
Macon	4	7		11	10	1		11			
Madison	7	3		10	8	2		8	2		
McDowell	22	18		40	29	10	1	25	11		4
Mitchell	1			1		1		1			
New Hanover	2	2		4		4		3	1		
Onslow	7	3		10		10		6	2		2
Pamlico	9	6		15		13	2	14			1
Pender	14	10		24	1	16	7	16	8		
Rutherford	1	3		4		4		4			
Swain	1	1		2	1	1		2			
Transylvania	1	1	2	4	3	1	1	3		1	
Watauga		1		1		1			1		
Yancey	6	3		9	2	4	3	6	3		
Totals	271	146	4	421	186	206	29	338	63	7	13

1986-87 Reported White-Tailed Deer Harvest

County	Sex Harvested				Total Harvest	Antlered Bucks Per Sq. Mile*	Weapon					Location	
	Antlered Bucks	Button Bucks	Does	Not Listed			Shotgun	Rifle	Muzzle-Loader	Bow	Hand-gun	Game Lands	Other Lands
Alamance	259	20	76		355	1.36	85	202	35	32			355
Alexander	115	9	26		150	0.69	6	86	37	19			138
Alleghany	493	55	218		766	4.07	8	429	124	191	4		766
Anson	703	102	338	5	1,148	2.01	248	717	97	67	4	28	938
Ashe	329	54	130		513	1.35	2	301	121	79	2	14	430
Avery	52	5	10		67	0.29	2	47	5	12	1	59	7
Beaufort	1,349	81	495	2	1,927	2.86	156	1,634	38	24		87	1,642
Bertie	1,550	174	758	4	2,486	3.13	1,698	669	25	31	2	36	2,112
Bladen	1,727	111	564	5	2,407	2.60	1,324	970	28	34	3	53	1,986
Brunswick	939	101	410	5	1,455	1.45	1,174	218	11	11	1	12	1,249
Buncombe	140	3	20		163	0.33	4	150	7			38	119
Burke	615	80	226		921	1.59	49	669	66	130	1	198	685
Cabarrus	14		1		15	0.09	11		1	2	1		13
Caldwell	317	23	67		407	0.89	19	309	19	57		143	238
Camden	186	3	8		197	1.29	111	82					197
Carteret	336	16	93		445	1.12	180	226	19	15		94	327
Caswell	1,056	193	597	5	1,851	4.07	789	771	136	135	3	259	1,457
Catawba	109	6	22		137	0.68	4	68	20	43			130
Chatham	821	71	248	10	1,150	1.76	198	685	141	110	4	269	824
Cherokee	13				13	0.03	2	11				13	
Chowan	386	52	235	2	675	4.73	281	330	23	27			675
Clay	35				35	0.20	2	30	2			22	7
Cleveland	120	2	5		127	0.58	5	104	4	12		7	114
Columbus	984	37	207	8	1,236	1.53	828	330	35	11	3		1,236
Craven	1,525	80	457		2,062	3.07	360	1,558	44	50	1	185	1,657
Cumberland	733	148	501		1,382	2.00	172	1,109	10	75	3		1,326
Currituck	257	10	33		300	2.42	90	204	2	4		2	259
Dare	158	2	13		173	0.61	62	70	15	21	1	107	60
Davidson	445	44	138		627	1.72	30	441	72	75	2	32	573
Davie	221	14	50	1	286	2.00	18	173	58	36		4	245
Duplin	723	31	167	1	922	1.57	361	533	3	4		3	740
Durham	165	27	94		286	1.08	144	108	15	13	1	138	121
Edgecombe	1,027	113	406	2	1,548	4.15	623	800	28	42	9		1,548
Forsyth	22	3	2		27	0.16	2	17	5	3			27
Franklin	640	40	119		799	2.29	564	207	11	12	1	37	700
Gaston	15	2	6		23	0.09	4	5	5	9			23
Gates	1,217	263	903	7	2,390	5.06	1,995	367	16	18	7	50	2,207
Graham	15		1		16	0.05		15		1		10	
Granville	889	78	343	4	1,314	2.71	493	655	85	74		153	956
Greene	71	1			72	0.58	24	44	1		1		66
Guilford	100	9	26		135	0.41	35	83	8	6			118
Halifax	1,692	210	809	3	2,714	4.19	836	1,711	55	54	8	76	2,333
Harnett	104	1	1		106	0.31	56	43	2	4			79
Haywood	131	9	9		149	0.32	2	120	2	24	1	137	8
Henderson	104	2	4		110	0.46		96	5	8		65	36
Hertford	609	81	282		972	2.61	751	197	2	3	1		972
Hoke	112		2		114	0.45	97	14		2			113
Hyde	740	90	436	1	1,267	2.13	322	794	81	49	7	48	1,131
Iredell	352	37	87	2	478	1.42	28	294	91	58	1		433
Jackson	5				5	0.01		5				3	

County	Sex Harvested				Total Harvest	Antlered Bucks Per Sq. Mile*	Weapon					Location	
	Antlered Bucks	Button Bucks	Does	Not Listed			Shotgun	Rifle	Muzzle-Loader	Bow	Hand-gun	Game Lands	Other Lands
Johnston	240	13	44		297	0.60	66	211	4	7	1	2	274
Jones	1,175	71	408	1	1,655	3.30	176	1,386	33	15	3	129	1,293
Lee	86	1	1		88	0.52	14	63	6	3		7	74
Lenoir	294	23	73	3	393	1.55	52	331	4	1			341
Lincoln	31	2	2		35	0.22	6	17	6	4			35
Macon	93	1	3		97	0.21	4	85	1	5		81	8
Madison	67	6	9		82	0.20	2	62	1	16		50	24
Martin	914	43	188	4	1,149	3.21	714	391	8	9	3		1,149
McDowell	236	9	29		274	0.65	6	201	17	48	2	152	122
Mecklenburg	37	6	13		56	0.16	31	2	10	12			49
Mitchell	73	2	13		88	0.45	2	56	6	22	1	27	56
Montgomery	1,140	168	533	2	1,843	2.92	236	1,143	267	159	12	311	1,450
Moore	181	10	24		215	0.34	157	47	3	4		7	178
Nash	245	10	15		270	0.88	79	182	2	3	2		270
New Hanover	98	6	46	2	152	0.99	76	65	3	2	2		123
Northampton	1,374	200	663	1	2,238	4.31	1,132	972	29	44	7	14	1,891
Onslow	948	86	384	7	1,425	1.79	958	393	16	38	1	47	1,270
Orange	407	28	129	2	566	1.82	177	294	60	26	2	7	502
Pamlico	559	22	124	3	708	2.96	57	612	17	9	1	3	667
Pasquotank	129	2	20		151	1.57	81	67					151
Pender	1,393	148	731	1	2,273	1.94	1,058	1,103	16	40	5	21	1,915
Perquimans	381	25	115	3	524	3.28	207	302	1	7	1		524
Person	544	28	198	1	771	2.52	327	355	59	24	1	29	631
Pitt	856	42	330	4	1,232	2.82	161	988	25	21	3		1,232
Polk	128	1	3		132	0.72	4	103	7	8	1	58	63
Randolph	406	44	127	1	578	0.85	63	372	58	76	2	29	521
Richmond	578	66	271	2	917	1.64	525	342	19	12	3	95	711
Robeson	370	28	162	1	561	0.85	361	121	4	6	2	1	436
Rockingham	469	37	110	1	617	1.55	84	396	44	85			617
Rowan	270	35	91	1	397	1.22	43	250	41	61		22	342
Rutherford	296	5	7		308	0.74	19	247	15	20		31	265
Sampson	636	47	197	3	883	1.19	338	500	6	19	1		812
Scotland	381	11	42		434	2.06	333	60	4	35		130	284
Stanly	223	14	76	1	314	1.37	35	192	35	47		4	303
Stokes	124	7	23		154	0.47	18	96	16	24		3	114
Surry	150	9	38		197	0.55	13	124	23	34			197
Swain	11				11	0.02	3	7		1		8	3
Transylvania	104	4	3		111	0.32	4	94	3	7		72	19
Tyrrell	174		17		191	0.70	29	143	14			15	148
Union	34	1			35	0.13	3	30	1	1			28
Vance	387	4	47		438	2.78	172	229	11	12	1	20	362
Wake	116	4	11		131	0.26	28	88	4	10		23	103
Warren	725	89	360	1	1,175	2.44	812	317	7	14		37	1,032
Washington	259	32	47	1	339	1.69	76	195	20	45		7	321
Watauga	30	2	3		35	0.16	1	20	9	5			30
Wayne	90	5	9		104	0.37	38	57		2			104
Wilkes	578	40	140		758	1.04	19	475	124	123	4	79	613
Wilson	35				35	0.22	23	12					33
Yadkin	131	2	9		142	0.96	11	78	18	31	3		116
Yancey	146	11	23		180	0.57	3	117	21	39		82	98
State Total	43,077	3,945	15,556	113	62,691	1.46	23,055	32,697	2,709	2,924	137	4,048	52,122

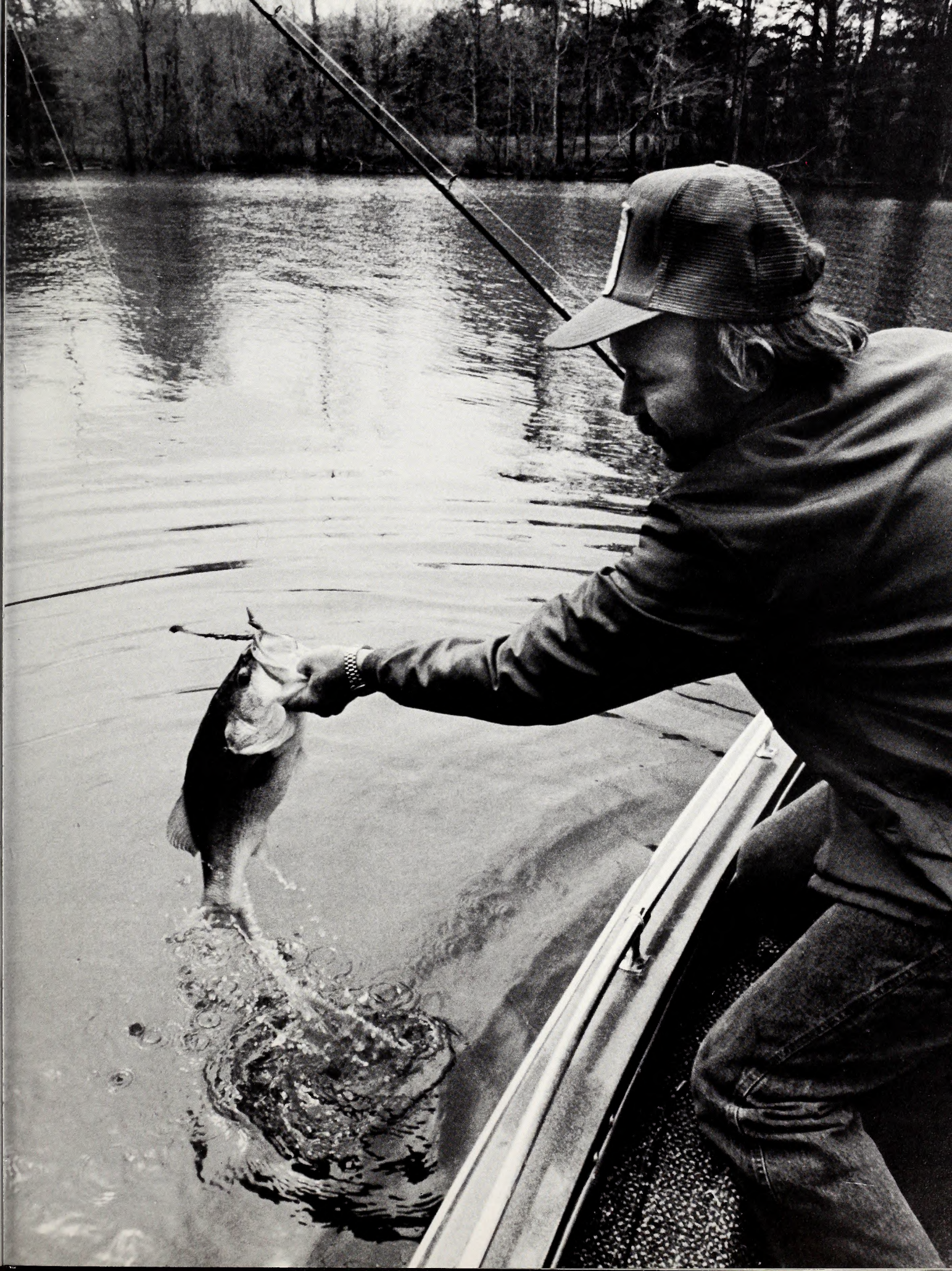
*Square miles of forest as index of deer habitat.

1986-87 Reported Wild Boar Harvest

County	Male	Female	Total	Game Land	Other Land	Unk. Land	Rifle	Shot-gun	Hand-gun	Unk. Gun
Burke	4	1	5	2	3		1		2	2
Caldwell	1		1		1		1			
Cherokee	7	5	12	10		2	4	6	1	1
Clay	2		2		2		2			
Cleveland		2	2		2				2	
Graham	73	75	148	139	6	3	132	10	2	4
Jackson	1		1	1			1			
Macon		2	2	2				1		1
Rutherford	1	3	4		3	1	2	2		
Totals	89	88	177	154	17	6	143	19	7	8

1986 Reported Wild Turkey Harvest

		Age			Location			Weapon Used			
County	Turkey Reported	Adult	Juvenile	Unk.	Game Land	Other Land	Unk. Land	Shotgun	Bow	Muzzle Loader	Unk.
Alamance	13	11	1	1		13					
Alleghany	20	16	4			20		20			
Ashe	42	37	5		1	24	17	41			1
Bertie	51	37	14			51		47			4
Bladen	2	2			1	1		2			
Buncombe	2	2			1		1	2			
Burke	1	1			1			1			
Carteret	1		1		1			1			
Caswell	103	92	9	2	15	85	3	99			4
Chatham	20	17	3		5	14	1	20			
Cherokee	17	16		1	10	4	3	17			
Clay	5	5			5			5			
Durham	3	3				3		3			
Franklin	2	2				2		2			
Graham	7	7			5	1	1	7			
Granville	9	8	1		1	7	1	9			
Halifax	26	15	11			22	4	24			2
Haywood	2	1	1		2			2			
Henderson	9	5	4		6	2	1	9			
Jones	1	1			1			1			
Macon	18	14	4		18			18			
Madison	3	1	2		3			3			
Martin	30	21	8	1		30		30			
McDowell	18	14	4		18			15		1	2
Montgomery	12	9	3		5	7		11			1
Moore	1	1			1			1			
Northampton	8	7	1			8		8			
Onslow	24	19	5		1	23		18	1		5
Orange	10	10				10		10			
Person	36	31	5		1	32	3	32	1		3
Richmond	10	7	3			8	2	8			2
Robeson	1	1				1		1			
Rockingham	11	11				11		11			
Swain	4	4			1	3		4			
Transylvania	12	12			5	2	5	11		1	
Wake	1	1					1	1			
Watauga	2	2				2		2			
Wilkes	3	2	1		1	2		3			
Totals	540	445	90	5	109	388	43	512	2	2	24



The Urban Angler

When Jimmy Smith is not working at his bait and tackle store, he spends time plugging his favorite fishing hole, Burlington's Lake Cammack (800 acres). Jimmy fishes Lake Cammack from February until April with a jig and pig (leadhead jig and pork chunk), plastic worm (black or grape) and deep running plugs like the Chatter Bee-3. He prefers bait-casting tackle with 8- to 14-pound test line. He uses the 8-pound test when fishing a deep-running plug and 12- to 14-pound test when fishing plastic worms or the jig and pig. Jimmy sets his drag at medium-tight and suggests that anglers test the drag at the rod tip and not at the reel. Productive sites for him on Lake Cammack have been around large exposed rocks which heat up in the early spring and attract fish. For early morning fishing, he prefers to fish the sunny banks near shore for a period of two hours, especially if there is a slight ripple on the water. When fishing points, he takes his time and fishes them from several different angles. "Never leave a good spot until you have tossed a worm into it," he says.

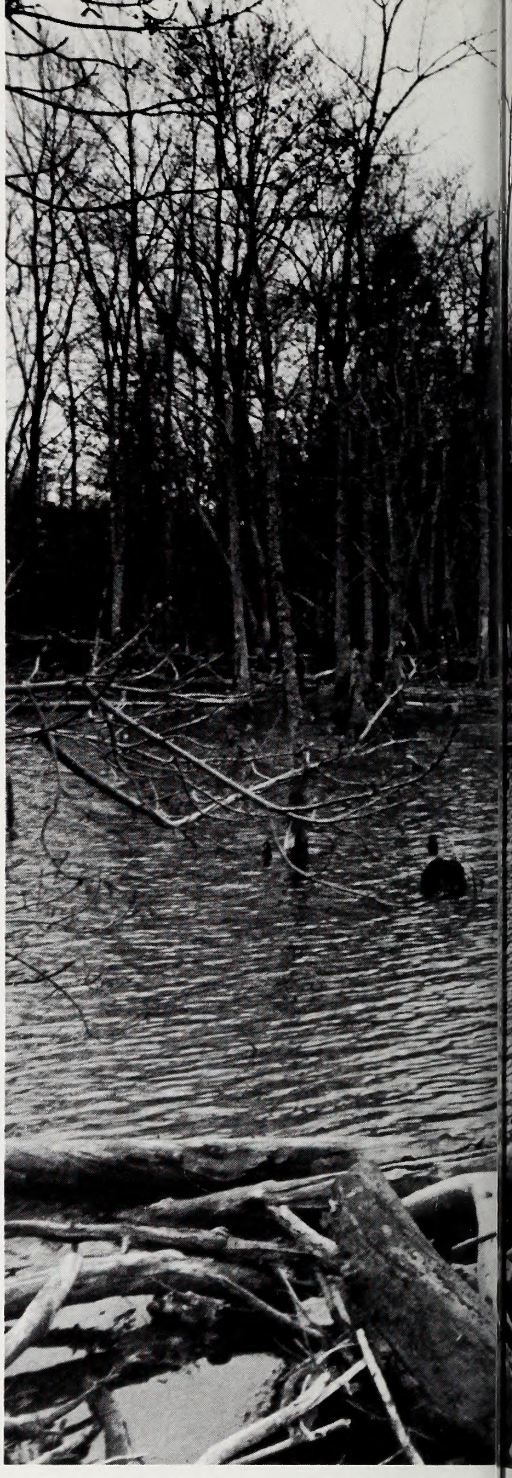
Hybrid Bass Lakes

The Wildlife Commission produces hybrid bass by crossing striped bass (females) with white bass (males). The first stockings of these fish in city lakes were made in 1977. The fast-growing hybrids have been stocked on an annual basis in several Piedmont city lakes, and two of the better hybrid bass lakes are Townsend (Greensboro) and Oak Hollow (High Point). Techniques for catching hybrids from these lakes include trolling, jump fishing and bottom fishing (tight-line).

Morlan Buck and Thomas Walters fish for hybrids on Lake Townsend (1,500 acres) by bottom fishing and trolling. Morlan catches most of his hybrids from early summer to late fall by fishing off shallow points adjacent to deep drop-offs from early morning to mid-afternoon. He tight-line fishes with the hook 3 to 4 feet off the bottom, and recommends a bait-casting reel with 12-pound test line. Morlan believes the best bait is chicken livers, but he also catches hybrids on minnows.

Thomas Walters, on the other hand, likes to troll for hybrids in Lake Townsend during the hot summer months when there is a slight breeze. He has caught his biggest hybrids (5 to 10 pounds) in the middle of the day on such plugs as Rebel Double Deep (black and silver) and Wee-R Rebels (black). Many of Thomas' hybrids are caught in open water near creek channels. He prefers an open-faced spin-casting reel on a graphite rod with 8-pound test line, and he sets the drag light. "Pound for pound the hybrid will out fight a largemouth bass or, for that matter, a striped bass," said Walters. Hybrid bass fishing at Lake Townsend was excellent in 1985, but slowed in 1986. Drought and low lake levels in 1986 were probably contributing factors to the poor fishing success.

At Oak Hollow Lake (800 acres) near High Point, some folks refer to Henry Draughn as the hybrid bass man. Henry fishes exclusively for hybrids, and he emphatically states that Oak Hollow is the place to catch them. Beginning in mid-February and into June you can find Henry trolling a Model-A Bomber or a 5-inch Sassy Shad along the flats and near points in 7 to 9 feet of water. Later in the year, he trolls with live shad at 10- to 15-foot depths, and sometimes fishes four rods at once. Henry uses special 7-foot rods and bait-casting reels with 17-pound test line with the drag set medium. When trolling with shad, Henry uses 2/0 to 4/0 stainless steel hooks that he sharpens. Hybrid bass have been known to straighten some hooks, but Henry has never had a hybrid straighten a steel hook.



Best Fishing In City Lakes

FISH SPECIES			
Largemouth Bass	**Crappie**	**Hybrid Bass**	**Channel Catfish**
Lake Thom-A-Lex	Lake Brandt	Oak Hollow Lake	Rocky Mount City Lake
Lake Michie	Lake Farmer	Lake Townsend	Quaker Creek Lake
Tar River Reservoir	Lake Reese	Lake Higgins	Oak Hollow Lake
Cane Creek Reservoir	Lake Ramseur	Lake Thom-A-Lex	Lake Townsend
Lake Brandt	Lake Thom-A-Lex	Lake Higgins	Lake Higgins
Lake Townsend		Old High Point City Lake	Tar River Reservoir
Lake Cammack			

A bass fisherman *tries his luck for largemouth bass in standing timber in a Piedmont municipal lake. Some of these lakes are large enough to handle sizeable bass boats, while others permit only small, paddle or electric-powered boats.*

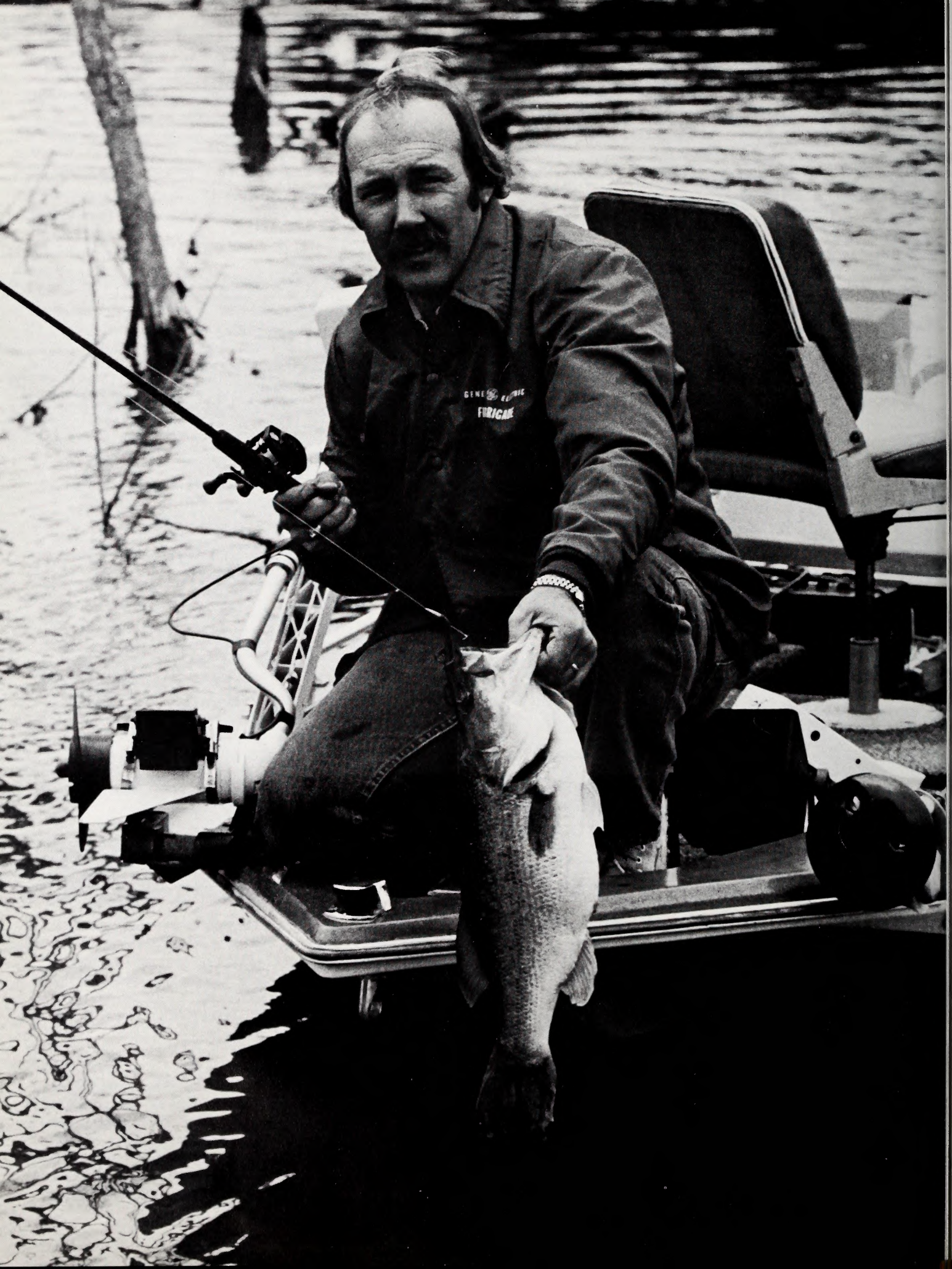
Another technique that several anglers use when fishing for hybrids at Oak Hollow is jump fishing. This involves catching hybrids during the summer months when they are feeding near the surface on schooling shad. Jerk baits such as a Tiny Torpedo or Speed Shad can be productive. The hairy worm when retrieved steadily also works well. Most techniques used for striper fishing work for hybrids, except you need to use smaller baits for the hybrids.

Crappie Lakes

In a 1982 angler-opinion survey of North Carolina fishermen, the Wildlife Commission found that black and white crappie are two of the most sought after sport fish in North Carolina. One reason is the crappie's fine eating qualities.

Some of the best crappie fishing in North Carolina can be found in large reservoirs, particularly the productive lakes of the Yadkin drainage. However, several small city lakes in the Piedmont support good crappie populations. These include new reservoirs such as Lake Farmer (Yanceyville), Lake Reese (Asheboro) and Lake Ramseur (Ramseur). Older lakes such as Brandt (Greensboro) and Thom-A-Lex (Lexington) also provide excellent crappie fishing.

Bill Saunders and Marks Farmer are crappie fishermen who fish Lake Thom-A-Lex year-round. Both Bill and Marks agree that the largest crappies are usually caught during April and May. The most productive sites are brush piles in 2 to 12 feet of water. Bill fishes with either cane or fiberglass poles with 6-pound test line. Favorite baits are jigs (redhead with white marabou hair) and


FURICANE

The Urban Angler

***Crappie fishermen** use cane poles and minnows to probe the deep water around this fallen tree lap. Crappies and bass are the two most popular species on municipal lakes, but fishing is also often good for panfish, catfish, and white bass, striper hybrids.*

live minnows.

Russell Walker of Greensboro has been a busy fisherman the past three years. During this time, he has placed 260 Christmas trees in Lake Brandt to provide cover and concentrate crappies. Russell fishes year-round, but his most productive period is from mid-April to mid-May. He catches most of his crappie in 2 to 10 feet of water with jigs (purple and chartreuse). Other productive sites on Lake Brandt besides Russell's fish hides are downed tree tops off deep shorelines and around submerged stumps.

In the fall of 1986, the Wildlife Commission surveyed the crappie fishery in Lake Brandt, one of the several lakes monitored in a new statewide crappie evaluation project. Biologists found equal numbers of black and white crappie in Lake Brandt with average fish size from 6 to 8 inches. Larger fish, however, accounted for only 11 percent of the total catch. Assessment of crappie populations will continue for the next three to four years as biologists gather information needed in determining future management decisions here and elsewhere for this important game fish.

***Ron Wheeler landed** this 6-pound, 8-ounce bass on a plastic spring lizard in a water supply lake. Though hardly a common catch, such fish are a possibility for skillful and persistent anglers.*

Channel Catfish Lakes

The channel catfish is growing in popularity with North Carolina anglers each year. Many Tar Heel anglers are discovering that Mr. Whiskers can provide one heck of a fight when hooked and is excellent served with hush puppies and slaw.

Typically, channel catfish inhabit the larger lakes and rivers in North Carolina and ascend small streams to spawn. Prior to the early seventies, channel catfish populations in most city lakes in the Piedmont were severely limited or nonexistent. Part of the problem was a lack of suitable spawning sites, and predation of young by other fish. In some cases, the species was not present in the water where city lakes were constructed. Fingerling stockings by the Wildlife Commission along with the stocking of larger channel catfish from cage culture has helped maintain, or in some instances, established sport fisheries for channel catfish in many Piedmont city lakes. Some of the better channel catfish fisheries can be found at Rocky Mount City Lake, Oak Hollow Lake and Quaker Creek Lake (Graham), to name a few.

Colon Guthrie, a Quaker Creek Lake Warden, is an avid catfish angler who spends his spare time dunking chicken livers at the lake with a young friend or two. Colon likes to fish for channels from April through October and has found the most productive times to be during the early mornings or late afternoons. He is certain the fishing would be good at night, but the lake closes at dark. Preferred baits are chicken livers, beef hearts or night crawlers. He usually fishes with a spin-casting outfit rigged with 10- to 12-pound test line and a bobber. Colon likes to fish near the bottom in coves and in the designated bank fishing area. Channel catfish are cage-reared near the boat dock adjacent to this bank-fishing area and many fish species are attracted because of the daily feedings. Ten years ago you could not catch a channel catfish in Quaker Creek Lake, but now the lake supports a good population. Just ask Mark Dabbs of Burlington who caught Quaker Creek Lake's 19-pound, 12-ounce record channel catfish in 1985.

Scott McHeeley and Jack Ashworth Jr. both agree the best method to catch channel catfish at Lake Higgins (Greensboro) is by baiting an area. Jack uses punctured cans of sardines while Scott pre-baits with corn or dog food. Both prefer night fishing with chicken livers, minnows and cut bait such as mullet. "The bigger channels prefer large chunks of cut mullet," said Jack. He catches most of his larger fish near the end of April. Good fishing also is available during the summer months, and Scott thinks the fall has been most productive for him. Best areas to fish Lake Higgins are near points off main creek channels and the mouths of coves. Both men fish on or near the bottom with spin or bait casting reels equipped with 12-to 17-pound test line. Jack fishes with wire hooks and sliding sinkers. A bead and rubber band are positioned approximately 18 inches above the hook to keep the sinker from sliding against the hook.

Every angler I interviewed agreed it was helpful to concentrate on a particular lake, and learn daily and seasonal feeding habits of the fish. To obtain more information about city lake fishing, write the N.C. Wildlife Resources Commission, Division of Boating and Inland Fisheries, 512 N. Salisbury Street, Raleigh, North Carolina 27611. Request the brochure entitled *City Lake Fishing.* ⊠

Marvelous Moths

The avid moth watcher is likely to encounter some raised eyebrows, but the rewards are evident for those who find beauty in unusual places.

written and photographed by Kerry Givens

The vividly colored false eyespot *of the luna moth serves an important purpose by directing predator attacks away from the body. In some cases, the brilliant markings frighten away potential attackers.*

It was 5 a.m. outside the little, brightly lit laundromat in Shallotte. Appropriately, a 5 o'clock shadow bristled on the chin of the state policeman who was questioning my friend Jeff and me. The beard, together with the bloodshot tinge to the officer's eyes (which were narrowed to slits in suspicion), meant he was nearing the end of his shift. He was also nearing the end of his rope, judging from his stare when I tried to explain what we were doing. He repeated my words in mild disbelief.

"Photographing *moths*?" he said, as if this was a strange thing to be doing at such an hour.

In retrospect, I guess we did look suspicious: two guys wearing electric headlamps, fiddling with piles of camera equipment, pausing occasionally to swing an 8-foot-long butterfly net through the air. Nearby, a hundred or so moths of every description peppered the surface of a brightly floodlamped wall.

The whole scene might have been just a bit too much for the overworked patrolman. Shaking his head slowly, he managed a smile as he got back into his car. "Moths, huh?" were his parting words.

Somewhere in this list-crazy world of ours, I'm sure there's a tabulation of America's favorite outdoor pastimes ranked in order of popularity. In the nature category, bird-watching always scores high. Wildflower watching is right up there, I'm sure. But I seriously doubt moth-watching has ever made it into the top 100. It probably falls somewhere between lichen-watching and raising leeches. Even some butterfly fanatics I know have trouble getting into moths. Why?

I think the explanation is two-fold. First, mention "moth" to the average homeowner, and he thinks of his favorite wool blanket—the one that was turned into a doily by hungry clothes moths, that is. (You can always spot someone who has had a run-in with clothes moths. Look for the electric bug-zapper handing *inside* the house). So, some moths have given the whole lot an undeserved reputation.

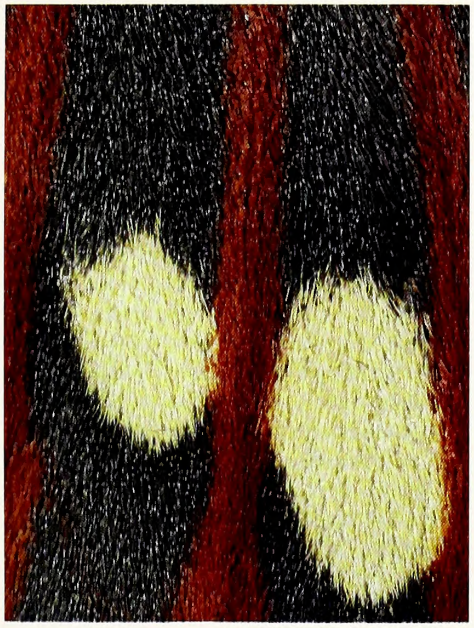
Moths also sleep all day and carouse all night, habits that are probably an adaptation to avoid the hordes of hungry birds working the dayshift. Unfortunately, moths' nocturnal habits make them less obvious to human observers. Out of sight, out of mind.

Which is probably where most of us prefer to keep moths. Indeed, many people think they know more about moths' diurnal cousins, the brightly hued butterflies, than they actually do. For example, because we see butterflies more often we may think they are more numerous than moths. But of the 135,000 or so worldwide species of *Lepidoptera*, moths comprise the largest number, about 111,000. Moreover, moths are distinctly different from butterflies, not just because they fly by night and wear a somewhat drabber dress (although there are some brilliant exceptions to the rule).

The luna silkmoth (Actias luna) *hangs from a leaf while expanding its distinctive wings. These beautiful silk-moths are among the largest of moth species. The large, plumelike antennae of this moth identify it as a male.*

The female spice-bush silkmoth (Callosamia promethea) *is lighter colored than the male. This species ranges over the Atlantic states from Florida to southern Canada and west to the Great Plains. The wings of butterflies and moths are covered with tiny scales of different shapes loaded with pigments that produce the colors. Touching a moth can remove some of these scales, leaving a scattering of "dust" on fingers.*

False eyespot pattern *on the wings of the silkmoth* (Automeris io).



***False eyespot patterns** of the regal moth* (Citheronia regalis).

***Tiger moth** rests on a Christmas fern. Moths, like butterflies, feed on flower nectar by hovering above the flower and uncoiling their proboscis, a coiled sucking apparatus that can be quite long in some cases.*

For centuries it was thought that moths were just nocturnal butterflies, but today scientists know that they are distinct in many ways, including important physiological ways. Moth bodies, for example, tend to be larger than those of butterflies in relation to their wings. Although butterflies and moths both change from caterpillars to pupae, the pupa of a butterfly is called a chrysallis, while that of the moth is a cocoon. Many moths spin cocoons, but butterflies don't. Butterflies rest with their wings folded over their backs; moths lay their wings down. The antennae of butterflies have little knobs at the end; those of moths taper to a point, usually, or fan out in leaflike growth.

I got my start in moth watching as a teenager. I had read that the cocoons of certain wild silkmoths could be found during winter after all the leaves had fallen. The distinctive plump, leafy capsules, clinging stiffly to naked fencerow saplings, were in fact quite easy to recognize. Soon I had collected a terrarium full of them. I hovered over them through the winter, waiting for the huge, spectacular insects to emerge.

The hobby was short-lived. One evening, while I left the tank unattended, a giant polyphemeus silkmoth made its exodus from the cocoon. In only a few minutes, its 6 inches of tawny brown wings had fully expanded and dried. Apparently not finding the terrarium to its liking, it took to flight. Too bad the idea of a lid had never occurred to me. The moth lofted out of my room and floated down the darkened hall. It was attracted to the light coming from my parents' bedroom.

Inside, my mother lay in bed, riveted tensely to a paperback copy of *The Exorcist*. She never saw the insect flutter silently into the room and glide under her bed. Later, the moth tried to fly out from under the bed, its wings making a ghostly thudding on the hardwood floor. That's when the screaming began.

Shortly after that, I was sent off to college. It was during that exile that my friend Jeff and I hit upon the idea of checking out floodlights for moths. Together we investigated a transformer building on a nearby hilltop, whose mercury-vapor lamps were visible for miles on clear nights. During the warmer months, these beacons drew a treasure trove of winged insects. Some nights, the air grew dense with bugs. Moths would somehow find their way under our shirts. On a really good evening, it was not uncommon to have a moth or two fly down our throats while we were talking.

We weren't the only ones eating moths. Toads stationed themselves under the powerful floodlights, and lapped up any unlucky moths that alighted on the ground. Occasionally a shrew would make the rounds, scurrying frantically along, pausing only to stuff another insect into its mouth. Bats appeared overhead every few moments, swooping silently into the light, and disappearing just as quickly. And at dawn, a team of hungry bluejays would arrive to pick off moths still clinging to the building's wall.

The demands of college, and then medical school, severely restricted my moth-watching. So, I made the pastime more convenient by setting up my own moth beacons at home. I knew that moths were most attracted to ultraviolet light (hence the fatal allure of the glowing blue UV tubes in those backyard bug-zappers). I bought a UV tube—sans electric death-grid—at my local hardware store, mounted it in a cheap fluorescent fixture, and hung it on my clothesline. Behind it I draped a white sheet, to serve as a reflector and a landing strip. This simple rig worked quite handsomely as a moth lure. When I needed a study break from the mounds of medical school texts, I would wander outside

Books About Moths

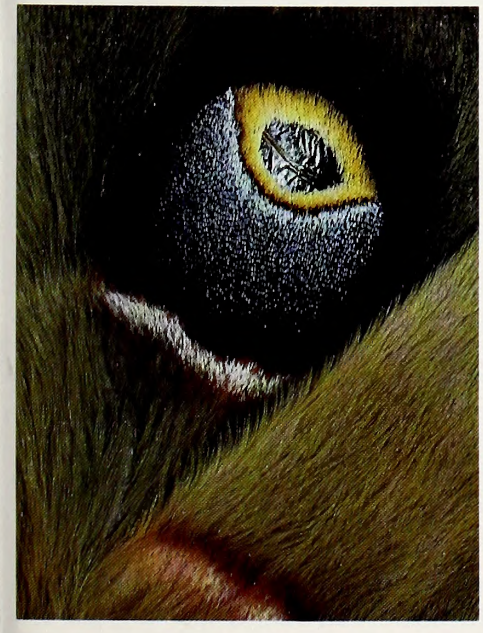
Golden Guide to Butterflies and Moths by Robert Mitchell and Herbert S. Zim. Western Publishing, 1964. Not intended to be an encyclopedic reference, this handy little volume is nonetheless an outstanding introduction to many of our most common and most conspicuous moths.

Peterson Field Guide to Moths of Eastern North America by Charles V. Covell, Jr. Houghton-Mifflin, 1984. More exhaustive than the above book, this guide illustrates hundreds of species. Includes data on flight season, larval food plants.

The Moth Book by William J. Holland. Dover Books, 1975. An affordable reprint of a turn-of-the-century classic.

Moths and How to Rear Them by Paul Villiard. Dover Books, 1975. Many native moths are surprisingly easy to raise at home, from eggs to adult.

A male imperial moth *(*Eacles imperialis*) is an impressively colored specimen. Moths, like butterflies, undergo complete metamorphosis as they grow. Hatching from eggs, they exist as caterpillars, molting their old skin occasionally. Many pupate within a silken cocoon and emerge as a winged adult.*



False eyespot pattern *of the polyphemus moth (*Telea polyphemus*).*

to see what the light dragged in.

North Carolina has hundreds of moth species. Even in my suburban yard, I was able to attract several dozen varieties. It was always a treat to see what each night would bring. Certain species, I noticed, would typically arrive at the light early in the evening. Others would not appear until the early morning hours. The stunning, pale green luna silkmoth, for instance, would rarely float in until after midnight. I routinely awoke before dawn to check for such stragglers. Once my early morning vigil was rewarded with a rare sight: a beautiful, maroon and yellow imperial moth, resting on the sheet.

Moth-watching is more fun than just sitting next to a UV light. The insects have some interesting behaviors to observe. Some moths can hear, for instance. Bats—major predators of moths—zero in on their prey by following echoes of their own high-pitched, ultrasonic cries. Although these sounds cannot be heard by humans, some moths can detect bat "sonar." They react to it promptly, abruptly changing their flight direction. Some moths go into wild, unpredictable spirals, or even drop straight to the ground. You can witness these evasive maneuvers yourself. Jingle a bunch of keys or coins the next time you're near a streetlamp that has attracted a few moths. This often produces enough ultrasonic noise to elicit the erratic flight response.

Moths are most easily found at night, but some are day-flying. The aptly named hummingbird clearwing moth is one common example. This black and yellow moth strongly resembles a bumblebee, especially when it hovers beelike around flower gardens. And like a bumblebee, its wings are scaleless and transparent. However, unlike the bee it mimics, the hummingbird clearwing moth feeds only on the wing. Hovering in midair, it sips nectar through a tongue as long as its body.

I have had memorable daylight encounters with moths. While hiking in Durham County one summer day, I found the tattered bodies of five different luna silkmoths at widely distant spots along the trail. They were all lying right along the path, and they were all female, as evidenced by their thin antennae (males have distinctive, plumelike headgear). Chances are they spent their final hours laying their eggs on trailside saplings, the cleared path providing an easy avenue for flight. On another occasion, I was inspecting a tulip tree sapling along the same trail for caterpillars. As I bent a leafy branch, I came face-to-face with a beautiful, chestnut-colored tulip tree silkmoth. She had just finished laying a patch of pure white, pinhead-sized eggs on a leaf.

One of the stranger bits of moth lore to be seen in our state involves a predator that specializes on these insects: the moth cordiceps fungus. More than once I have found the corpse of a moth engulfed by the bristly fruiting bodies of this killer. Usually I find the moth's carcass perched in a small sapling, as if it had just climbed from its subterranean pupa to expand its new wings.

Moths can turn up in some unlikely locations. While exploring caves one winter, I encountered a pretty pink and brown moth within several different caverns. My books later told me the critter answered to the name of *Scoliopterix libatrix*, a species well-known for its habit of hibernating in caves. How the moth finds the caves, however, is totally unknown. (Might it follow the ultrasonic cries of bats, which often hibernate in the same caves?) On another occasion, while splitting open a rotten log in my backyard, I found two copper underwing moths resting quietly in the interior. How they penetrated into the middle of the pulpwood, I don't know.

Want to learn more about moths? The nearby box lists some references that I've found indispensible. They'll show you the astounding variety of these underrated insects. There's no substitute, however, for finding moths on your own. Pick a moonless or cloudy night, head for a building with floodlights, and you're certain of success. And if there are no bright lights near your home, let me tell you about this little laundromat I know.... ⊠

Burned-over Areas Feed Quail

Forest Service Promotes Wider Use Of Fire By Landowners

Written and Edited by Mark Taylor

Landowners who wish to use fire to manage their woodland will find it easier in the near future. The N.C. Forest Service's new Landowner Reduction Prescribed Burning Program aims to reduce the damage from wildfires by encouraging the use of controlled burns. Such fires reduce fuel loads in the forest and improve wildlife habitat.

"We experienced fairly severe fire seasons in 1985 and 1986," said Dane Roten, fire-control officer for the N.C. Forest Service. "Although we had severe droughts, we feel that more widespread use of controlled burns to reduce fuel loads in the forest would have lessened this damage. In the past, we've done the actual burns on private lands ourselves, but we just can't treat enough acreage to really be effective. Under this new program, however, landowners will conduct the controlled burns with the assistance and supervision of their county forest rangers."

The Forest Service will assist by developing fire-management plans for landowners, and by plowing the fire lines around the area to be burned. The burns will be done only from December through February, when conditions are safest for burning. During this period, the Forest Service will also monitor weather conditions. Landowners will select the days they wish to burn, and will be notified if weather conditions are suitable. District fire crews will be alerted, and will be on standby in case a fire escapes.

"Many landowners are hesitant to burn their woodlands, but prescribed burns are an excellent management tool for fire control and improving wildlife habitat," said Roten. "This hesitation is understandable, and we plan to assist landowners in any way we can. This program should greatly increase the acreage we're able to treat, and we hope to be using controlled burns on 100,000 acres within 10 years."

Terry Sharpe, small-game project leader for the Wildlife Commission, feels that the program will greatly benefit most wildlife populations.

"The use of fire increases the diversity of plants found on an area, and this invariably results in more food and better cover for all wildlife species," he said. "The best quail hunting in the country is found on many private quail plantations in the Deep South, and these are often burned every year. In North Carolina, we use controlled burns extensively on the Sandhills Game Land to improve wildlife habitat for quail. Fire plays a natural role in maintaining the ecology of the longleaf pine forest, and we conduct prescribed burns on about 10,000 acres of the nearly 60,000-acre game land annually.

"However, not only game species, such as quail, rabbits and deer, benefit from controlled burns. Many songbirds, small mammals, and even endangered species such as the red-cockaded woodpecker benefit from fire. We're glad to see this new program in effect, and look forward to working with the Forest Service and landowners in the future."

Landowners who are interested in this new program should contact their county forest ranger or write to the N.C. Forest Service, 512 N. Salisbury St., Raleigh, N.C. 27611.

JACK DERMID

A Good Day's Work: *A new N.C. Forest Service program is encouraging landowners to use prescribed burns more. These burns lessen the danger of wildfires by reducing flammable material in the forest. They also improve habitat for quail and other wildlife.*

Order One Soon

Sportsman's Stamp Print Available

Going Fast: *Prints of the 1987 North Carolina Sportsman's Stamp, which features this painting of a wild turkey by wildlife artist Louis Frisino, are still available. Funds from the sale of these prints support many different wildlife programs. These prints may be obtained from art dealers across the state, but orders should be placed as soon as possible.*

Rivers Honored During Month

June is American Rivers Month, and to celebrate this event, many groups are sponsoring special events.

"These range from stream cleanups to recreational activities such as canoe trips and raft races," said Alan Clark, North Carolina Rivers Month Coordinator with the N.C. Division of Water Resources. "To help citizens celebrate American Rivers Month, we've even put together a special calendar of events."

Single copies are available free by writing Rivers Month Calendar, N.C. Division of Water Resources, P.O. Box 27611, Raleigh, N.C. 27611.

Radio Collar Proved Deadly

Officers Save Hibernating Bear From Suspected Poacher

In a bizzare chain of events last winter, wildlife enforcement officers stepped in to save a 350-pound male black bear from a suspected poacher.

Wildlife officer Roger Gibby of Canton learned through an anonymous telephone call that the unidentified poacher had located a hibernating bear and was making plans to kill it. The informant also said the poacher had recently shot another black bear while it slept in a dead tree near the Blue Ridge Parkway.

Both bears were being studied by researchers at N.C. State University. The bears were wearing radio transmitting collars, which allowed the researchers to monitor their location.

According to the informant, the poacher had the transmitting frequencies of the collars and had used a directional receiver to locate the sleeping bears.

Gibby passed his information on and a few days later, personnel with N.C. State University, the U.S. Forest Service, and the N.C. Wildlife Resources Commission were picking their way along the rubble-strewn slope of Mt. Pisgah to the bear's den.

In a grueling effort that lasted several hours, the rescuers first drugged the bear and then removed it from its cave, loaded it on a stretcher, and carried it nearly a quarter of a mile over treacherous terrain to a tram owned by WLOS-TV of Asheville. In several particularly tough spots, the stretcher holding the bear had to be suspended from ropes as it was eased over huge boulders.

The radio collar was removed, and the bear was released deep within the Pisgah Bear Sanctuary. Hopefully, this winter's nap will be more peaceful than the last.

—Jay Davies

JAY DAVIES

Desperate Measures: *This hibernating black bear was tranquilized and moved from its den last winter to save it from a suspected poaching attempt.*

Helps Save Habitat

Pintails On New State Duck Stamp

A Beautiful Sight: *This painting of a pair of pintails by wildlife artist Larry Barton is featured on the 1987 North Carolina Waterfowl Conservation stamp and print. Funds from the sale of these stamps and prints are placed in the North Carolina Waterfowl Fund, and are used for the management and conservation of waterfowl in North Carolina. Approximately $186,000 from this fund, for example, was used to help purchase several key tracts of bottomland hardwood forest on the Roanoke River. These lands offer ideal habitat for many species of waterfowl. The 1987 North Carolina Waterfowl Conservation stamps will be available from license agents after July 1, and limited-edition art prints of the stamp may be ordered from art dealers across the state.*

Available Free From Commission

Brochure Offers Tips On Helping Small Game

Want to manage your land effectively for small game? The Wildlife Commission recently published a brochure on this subject entitled *Tar Heel Wildlife on the Farm*. The brochure offers detailed information on how farm lands, crops, and woodlands may be managed to improve small-game populations, especially quail and rabbit.

"This publication is basically an updated version of the original *Tar Heel Wildlife on the Farm*, published many years ago," said Terry Sharpe, small-game project leader for the Wildlife Commission. "Of course, since farming practices have changed in recent years, so has wildlife management. This brochure shows how the needs of wildlife may be incorporated into modern farming and forestry practices. This booklet will give landowners an excellent start in improving small-game populations, and Commission wildlife biologists are also happy to help landowners develop small-game management plans for their lands."

Single copies of *Tar Heel Wildlife on the Farm* may be obtained free from the Division of Wildlife Management, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Bass Limit Regs Change At Jordan Lake

Wildlife Commission Adopts New Regulations

The Wildlife Commission recently adopted a slate of new hunting, fishing and trapping regulations after gathering comments from over 3,000 sportsmen at a series of public hearings held across the state. These regulations go into effect on July 1, and major regulation changes are listed below.

- A 16-inch minimum-size limit and a four-fish daily creel limit has been placed on black (largemouth) bass in B. Everett Jordan Reservoir.
- A four-fish daily creel limit with no harvest between the lengths of 12 and 16 inches has been placed on black (largemouth) bass in Falls-of-the-Neuse and Tuckertown lakes. Only two bass less than 12 inches long may be retained in the daily creel limit.
- A five-fish daily creel limit for black (largemouth) bass has been established on Kerr and Gaston lakes.
- The creel size and limit on hybrid striped and white bass was changed in W. Kerr Scott Reservoir to an eight fish daily creel limit with a 16-inch minimum-size limit.
- The daily bag limit for deer was increased from one to two animals and the season limit from two to four animals in and west of Madison, Buncombe, and Rutherford counties.
- A bear season was established in Hyde County running from Nov. 9-14.
- Waterfowl hunting will be allowed only from one-half hour before sunrise until 1 p.m. on designated hunting days on the Butner, Falls-of-the-Neuse, New Hope and Shearon Harris game lands.
- Dog-training regulations on game lands west of I-95 will be left as they were during the 1985-86 season (game lands closed to dog training from April 1 through August 15) with the exception of authorized field trials.
- Releasing or allowing pen-raised turkeys kept under a propagation license to range free will be prohibited.
- A regulation requiring hunters to report to a check station prior to hunting on the Sandhills and Bladen Lakes game lands was eliminated.

Complete information on these and other regulations may be found in the 1987-88 Hunting, Inland Fishing and Trapping Regulations Digest, which is available from license agents across the state.

Fishing Week Set For June 1-7

N.C. WILDLIFE RESOURCES COMMISSION

Something For Everyone: *Over 54 million Americans fish, and to celebrate this national pastime June 1-7 has been proclaimed National Fishing Week.*

Call Hotline For Information

Education Theme Of Safe Boating Week

N.C. WILDLIFE RESOURCES COMMISSION

Safety First: *National Safe Boating Week is being observed from June 7-13, and one of the best things boaters can do is take a safe-boating course. For information on courses in your area, call 1-800-336-BOAT.*

Large Contribution Made

Officers Support Endowment Fund

DEBBIE CONGER

The N.C. Wildlife Enforcement Officers' Association, *a professional organization of active and retired wildlife officers, recently presented a $1,634 contribution to the North Carolina Wildlife Endowment Fund. Interest from this fund supports a wide range of wildlife projects. Here, Wildlife Commission Chairman Jerry Wright of Jarvisburg (right) accepts the contribution from Master Officer Reuben Gunnells of Harrelsville, president of the association.*

"We appreciate this donation from the N.C. Wildlife Enforcement Officers' Association," said Wright. "We also appreciate the other worthwhile wildlife projects being undertaken by these officers, such as their scholarship program."

Shoot The Outdoors

The Orvis Guide to Outdoor Photography by C. Boyd Pfeiffer. 218pp., hardcover. Published by Winchester Press, 220 Old Brunswick Rd. Piscataway, N.J. 08854.

Taking good photographs is one way to get more pleasure out of the outdoors, and veteran outdoor writer and photographer C. Boyd Pfeiffer offers plenty of useful information in this book that will be helpful to both beginners and experienced photographers.

Detailed information is included on cameras and equipment (including how to build a variety of homemade tripods), composition, lighting, shooting fishing and hunting shots, and closeup and wildlife photography. Whether you just want to take better fishing pictures, or if you wish to photograph the insects, birds or wildflowers in your backyard, this book will be a valuable reference.

Illegal Night Deer Hunting Levels Off

Wildlife Officers Arrest 440 For Fire-Lighting In 1986

Fire-lighting for deer appears to have stabilized, judging from the number of cases made in 1986. The Wildlife Commission's Division of Enforcement made 440 arrests for this offense in 1986 compared to 441 in 1985. From 1980 through 1984, an average of 545 night deer-hunting arrests were made annually with a high of 658 cases in 1983.

"There are probably a number of reasons that have caused night deer hunting to stabilize, but one thing that has made a real difference is the expansion of county shining laws which prohibit spotlighting for deer," said Colonel Harold Ragland, chief of the Division of Enforcement. "In the past, when we received a spotlighting report we didn't know if it was legal or not. Now, when we receive a report we know that something illegal is going on, and that has made night deer hunting much more conspicuous. It's also enabled us to use our time more effeciently. We spend nine percent of our total time working on night deer hunting, and this is a major effort. We've also seen a corresponding increase in the number of cases made for violations of shining laws. We made 278 arrests for this offense in 1986 compared to 206 cases the previous year."

The highest number of night deer-hunting cases occurred in Wildlife District 2, which encompasses the central coastal counties. This area traditionally leads the state in fire-lighting because it has the densest deer populations and large areas of flat, open land. Fire-lighting was down slightly in most of the Piedmont, which Ragland attributes to the expansion of shining laws. In Wildlife District 8 and 9, which include mountain counties, fire-lighting was up considerably.

"The mast crop has a lot to do with how much fire-lighting occurs in the mountains," said Ragland. "If you have a poor mast crop, such as we had last year, the deer come out of the woods to feed in fields at night. This makes them much more vulnerable to poaching."

Two other statistics were particularly gratifying to Ragland. There were only two assaults on officers working night deer hunting, neither serious, and only five of the night deer hunters apprehended were cited for carrying concealed weapons.

"We didn't have any officers injured in assaults or in vehicular accidents or chases," he said. "That's always a blessing, because night deer hunting is considered one of the most hazardous details in wildlife enforcement."

Anglers' Coin New Meanings

Every sport has its jargon, and fishing is no exception. The following definitions can be found in any dictionary, but only anglers appreciate their true meanings. These were written by Henry Beard and Roy McKie in *An Angler's Dictionary* published by Workman Publishing Company, 1 West 39 St., New York, N.Y. 10018.

Wading - The most common means through which a dry-fly fisherman is transformed into a wet, fly fisherman.

Dry flies - Fly fishing lures designed to float on the surface of the water. There are hundreds of different dry flies, but they all fit into one of six categories: Mashed, Bent, Slimy, Hairless, Hookless and Hopeless.

Unsporting - Any fishing technique that has as its chief objective the capture of fish rather than the accumulation of fishing equipment.

Reservoir - A flood named after a congressman.

The Wildlife Endowment Fund Report

The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife In North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Status on March 31, 1987

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	26,183	$7,744,594.37
Lifetime Hunting License	168	34,221.23
Lifetime Fishing License	1,610	291,953.88
Lifetime Subscriptions to Wildlife in N.C.	987	121,934.35
Contributions	—	85,692.52
Fund Total		$8,278,396.35
Total Interest Earned	$1,656,121.88	

Calendar Of Events

June 12-13
North Carolina Blue Crab Festival and Derby at Morehead City. Crab races, arts and crafts, and cooked crab.

June 13-20
Big Rock Blue Marlin Tournament at Morehead City. For more information write P.O. Box 1673, Morehead City, N.C. 28557.

June 20-21
30th annual Governor's Cup Regatta at Kerr Lake at Townsville. North Carolina's oldest invitational sailing regatta. For more information contact Robert New, 6701 Perkins Dr., Raleigh, N.C. 27612.

June 20-21
19th annual Tar Heel Regatta at Lake Wheeler in Raleigh. Largest power-boat race on the East Coast. For more information contact Hubert Whitaker, 508 Brandywine Circle, Raleigh, N.C. 27614.

June 29-July 3
Cap'n Fannie Billfish Tournament at at Atlantic Beach. For more information write P.O. Box 7, Atlantic Beach, N.C. 28512.

Swamps Furnish Exotic Eating

A pond or marsh is a wonderful place on a warm summer evening, and some of its inhabitants furnish delicious—if unusual—eating. Snapping turtle or "cooter" stew, for example, was very popular during colonial times. This recipe was contributed by Terry Shankle, Piedmont field representative for the Division of Conservation Education. The recipe for the more easily obtainable frog legs is from Susan Sharpe of Hamlet, whose husband Terry is the Commission's small-game project leader.

Cooter (Turtle) Stew

5 lbs. turtle meat
1 lb. pork chops
1 lb. stew meat or venison
2-3 lbs. chicken
1 lb. onions
3 large cans tomato juice
½ gallon milk
2 Tbs. ground red pepper
1 small bottle A-1 steak sauce
salt and pepper to taste

Cook all of the meat together until done. Pick the meat off the bones. Combine the meat with all of the other ingredients and simmer for a minimum of two hours before serving. This recipe yields approximately four gallons of "cooter stew," and is said to be highly addictive. If there is any left over, it freezes well for future use.

Frog Legs

6-8 pairs frog legs
2 tsp. mustard
2 eggs, beaten
flour or Jiffy corn bread mix
salt
pepper

Wash and pat dry frog legs with paper towels. In small bowl, beat two eggs, add mustard and mix well. Dip frog legs into egg mixture then into flour mixture. Fry in ½" hot oil until golden brown and crisp.

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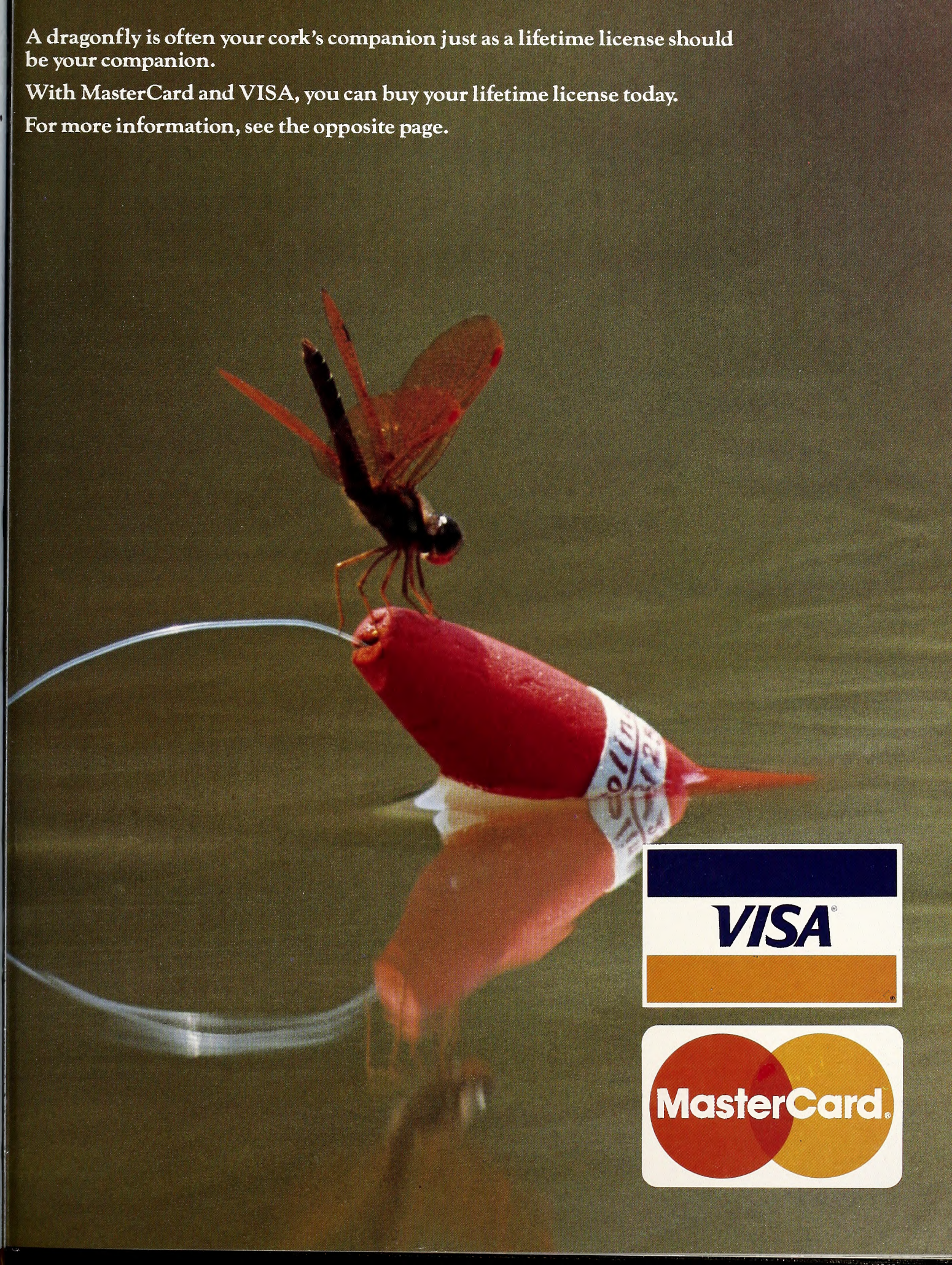

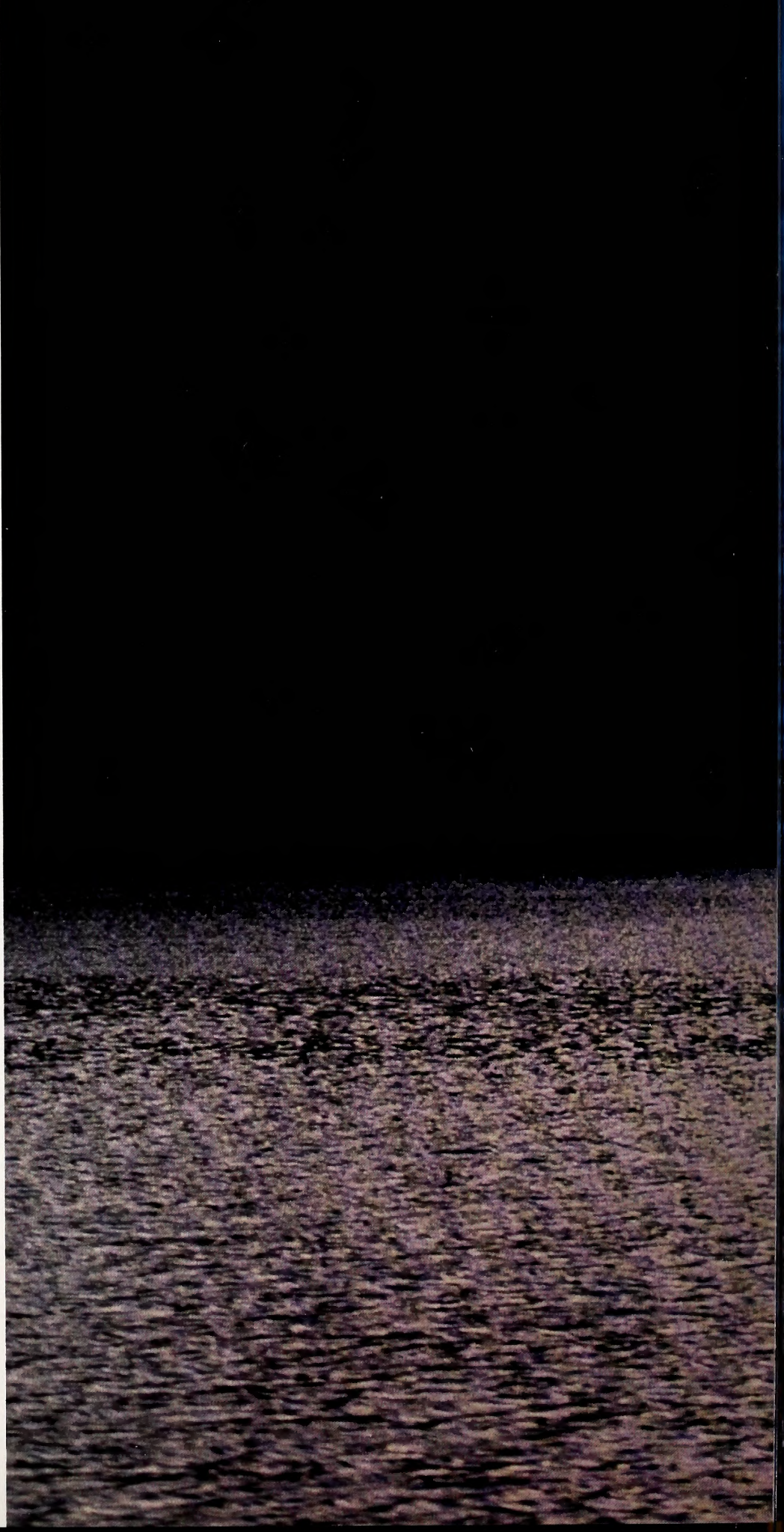

Afternoon Angling

A fading sunset silhouettes a boat and two anglers on a glittering lake in Piedmont North Carolina.

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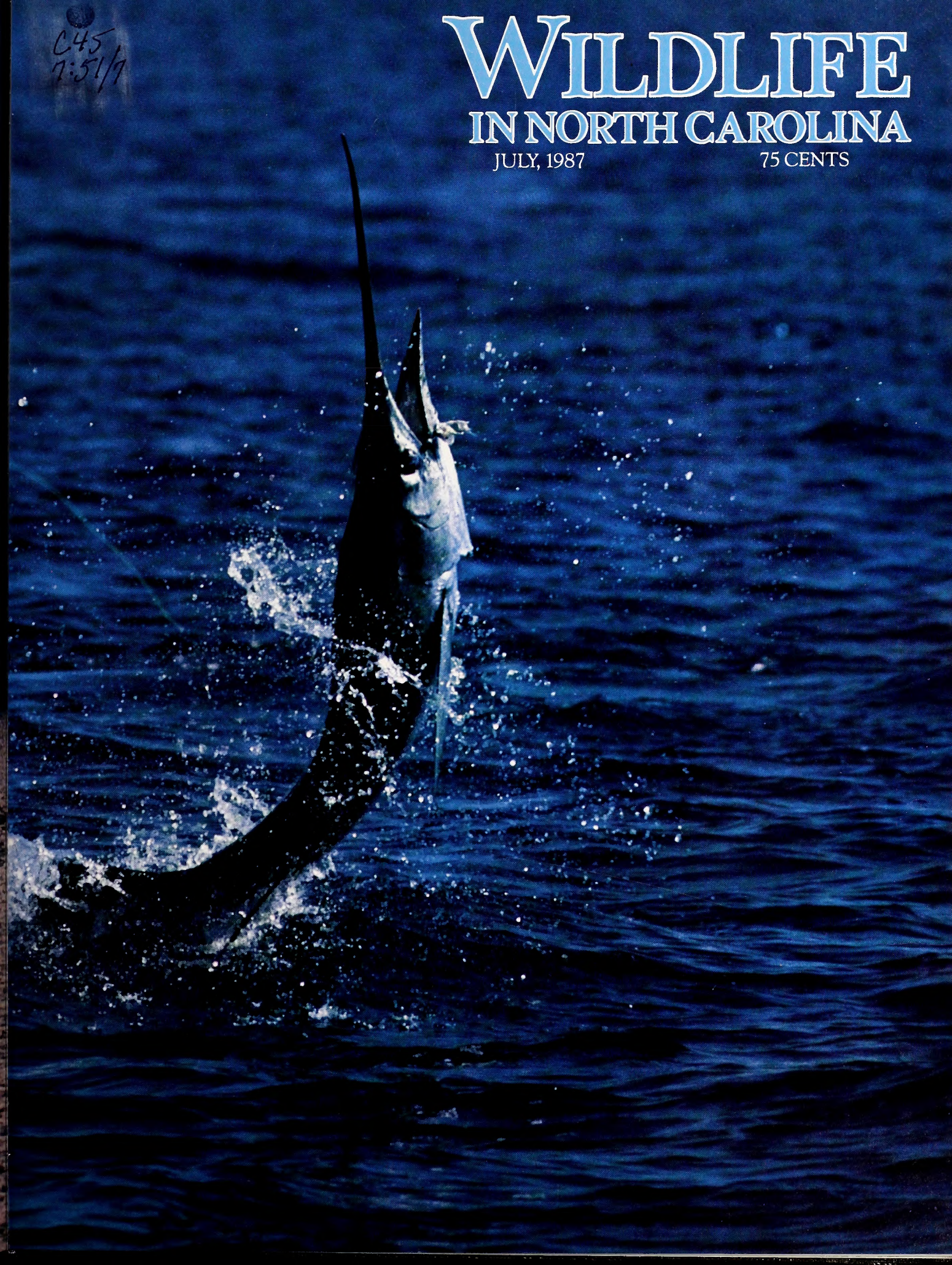
WILDLIFE IN NORTH CAROLINA

JULY, 1987 75 CENTS



Fishing And The Theory Of Relativity

by Jim Dean

Some fishermen prefer big water and burly fish, and they pursue their passion on massive lakes or the open sea. Other anglers prefer a more intimate setting — a small stream or lake where delicacy and finesse are paired pleasures and the size of the fish relatively unimportant. The key word here is "relatively."

I know one fisherman who bought his 9-year-old son an aquarium as a birthday gift. Together, they installed the gravel and plants, and picked out the fish, some of which by chance happened to resemble tiny bluegills.

KAY FRAZIER

Inevitably, the father began to wonder if those fish swimming happily under the fluorescent light could be caught. The aquarium was not, after all, unlike a tiny pond with macro weedlines and structure. The notion would not go away. What, he wondered, if I built a miniature foot-long flyrod out of split cane, and made a flyreel from a sewing machine bobbin? The line could be waxed string; the leader 8x nylon, and there are hooks available as tiny as size 28. In its own way, it could be challenging, and certainly convenient.

Given such musings, the father was therefore not altogether shocked when he happened to walk into his son's room one evening and surprised him in the act of feeding his fish with a tiny ball of white bread dangling from a length of sewing thread. Like father, like son — the brotherhood of anglers.

Hand in hand with an obsession for fishing goes an obsession for water, and even the smallest trickle or pothole can have its attraction. After some 40 years of fishing, I am learning to put this realization to good use.

I like to fish large impoundments for bass, and I suppose I'll always do so, but I have also renewed an early passion for pond fishing. There is seldom any competition from other fishermen which means you can fish slowly and deliberately without worrying that someone might pull in ahead of you. Your equipment needs are modest and inexpensive — a small boat and paddle or electric motor, and a handful of tackle.

I like to flyfish at dusk with deer-hair bugs or baitcast with topwater lures, and both techniques are ideal for ponds. I've also learned another very important fact. You are likely to catch more bass in an hour or two of pond fishing than you would all day on a large lake. True, many of the bass may be small, but the rewards are more frequent, and your chances of catching a real lunker are better than you might think. Furthermore, if the bass don't cooperate, you can always swap your bass bug for a bluegill bug and be fairly certain of catching something.

Fishing a pond carefully can be intensely delicious in ways that cannot be duplicated on a large lake. The same applies to other forms of angling.

Some years ago, the late Joe Brooks visited western North Carolina to fish some of our small trout streams. Brooks was a well-known book author and angling editor of *Outdoor Life*. He had caught tons of big trout all over the world. Yet, he was thoroughly enthralled with the challenges presented by the wild trout that populated the small stream he chose to fish.

Although most of the trout were less than 8 inches long, he stalked them with obvious pleasure, and displayed genuine admiration for a 12-inch, streambred brown he managed to fool. It was, he remarked, a more difficult fish to catch than the 10-pound brown trout he'd caught that year in Argentina. It was refreshing to hear him say that, and it confirmed something I had suspected for a long time. Bigger is not always better.

Years earlier after a hitch with Uncle Sam, I had little money for fishing tackle, and none whatsoever for such big budget items as boats. With few alternatives, I began wading the small, neglected streams of the Piedmont. I needed only an old pair of tennis shoes, an ultra-light spinning outfit and a handful of small spinners.

The shallow, rocky streams of Alamance and Orange counties were canopied corridors of near wilderness winding through rapidly developing areas, and they were seldom fished. It was not unusual to catch dozens of hand-sized robin, and occasionally there was a chance at a real trophy —a largemouth bass or pickerel that might go a couple of pounds.

Such fishing still exists in countless mid-state streams, and the angling pressure remains light. Perhaps it's because too few fishermen understand the theory of relativity as well as Joe Brooks. It's something I have tried to remember, but not always successfully. My memory is usually jogged, however, when I'm sitting fishless on a big lake under a blazing sun surrounded by water skiers and other anglers.

That's when I look again for small water, small trophies and big rewards.

July, 1987
Volume 51, Number 7

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Cover *A leaping sailfish is always a thrill, especially if you're the angler on the other end of the line, or if you're the photographer who captures the leap. Photograph by Joel Arrington.*

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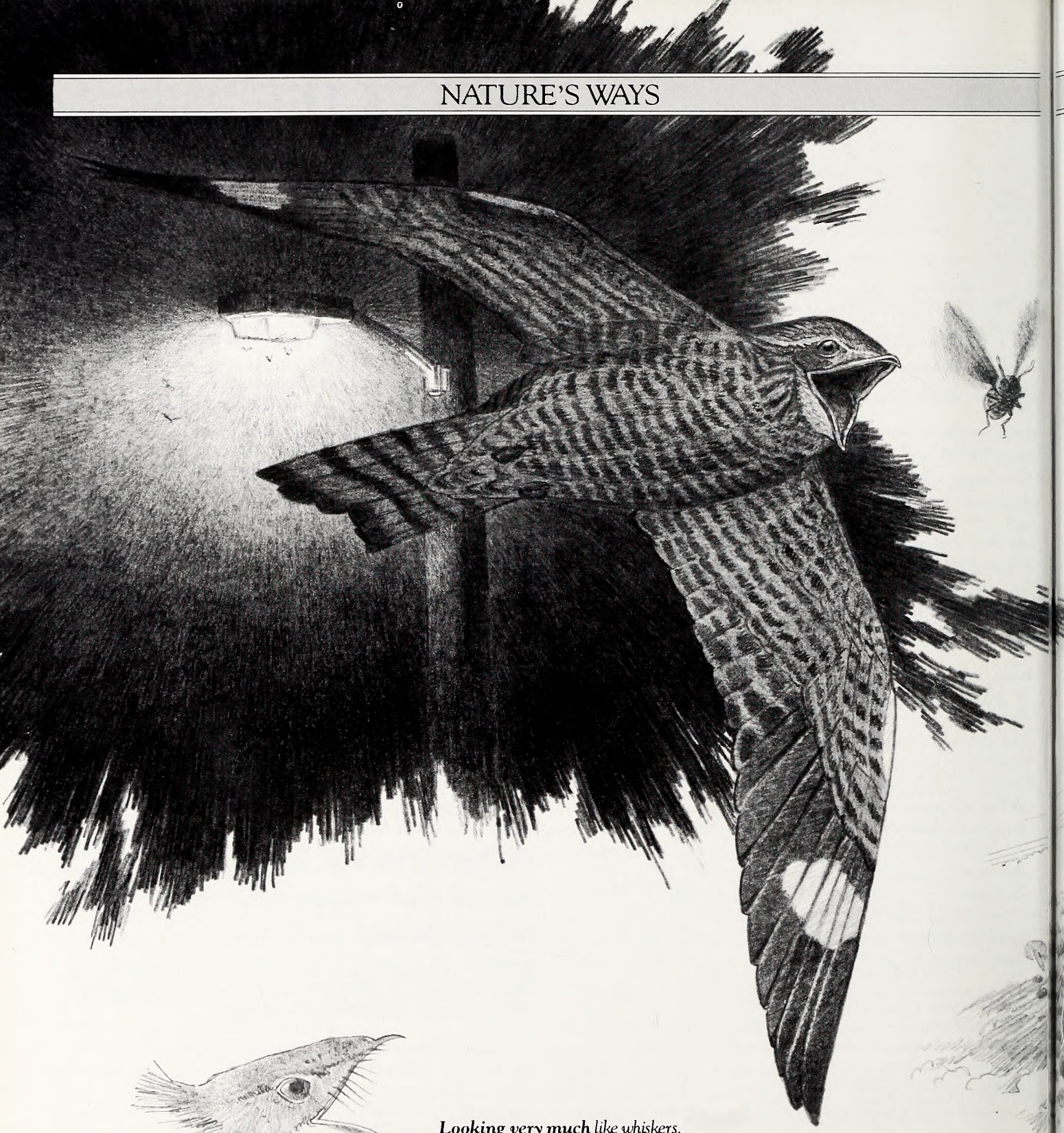
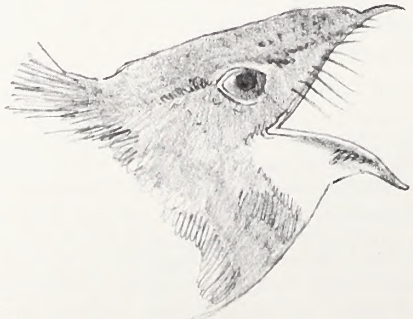




Looking very much *like whiskers, bristles grow around the wide mouths of nightjars to aid in hunting insects. Chuck-will's-widows and whippoor-wills have more elaborate bristles than their cousin the nighthawk.*

Boomers In The Night Sky

written by Lawrence S. Earley / illustrated by David Williams

They couldn't be bats — they were too big and flew in a very different way. What were they?

I had been distracted from a summer softball game one night by the flutterings and swoopings of several birdlike creatures near the lights in the left field. They weren't bats, but that's about all I knew. But several days later, after a quick visit to the N.C. Natural Sciences Museum in Raleigh, I discovered what they were: nighthawks, or, as they are called more often, bullbats.

Nighthawks are one of our fairly common nocturnal hunters throughout the summer season in North Carolina, although not many of us ever see them. They are misnamed, for they aren't hawks at all. They are members of a bird family once known as "goatsuckers" (so named for their cavernous mouths) and now called "nightjars." This family includes such North Carolina species as chuck-will's-widow and the whippoorwill.

Nighthawks have neither the ripping beak nor the slashing talons of a raptor, merely an oversized basket of a mouth that gulps insects on the wing. By day, this niche is filled by swifts and swallows, but once the sun sets nighthawks and bats take over. Sensitive bristles around their mouths help nighthawks swallow just about anything that can fit in their mouths (their cousins, the chuck-will's-widow, have been known to eat small birds). Special muscles enable their huge eyes to change focus instantly, an advantage when tracking a fluttering insect in the gloom of night.

Nighthawks are not permanent residents of North Carolina. They winter in Argentina and Brazil, and then when their southern hemisphere days grow shorter they migrate north, arriving here in mid-April. They leave in October, following the Central American land bridge to their winter homes. During spring courtship, the male exhibits a bizarre diving ritual that produces a booming sound "like a handful of marbles striking a bass drum," as one writer described it. The noise is caused by air rushing through its stiff wing feathers as the bird opens its wings at the end of its dive. Nighthawks share this noise-making trait with hummingbirds, snipe and other birds that engage in courtship diving rituals.

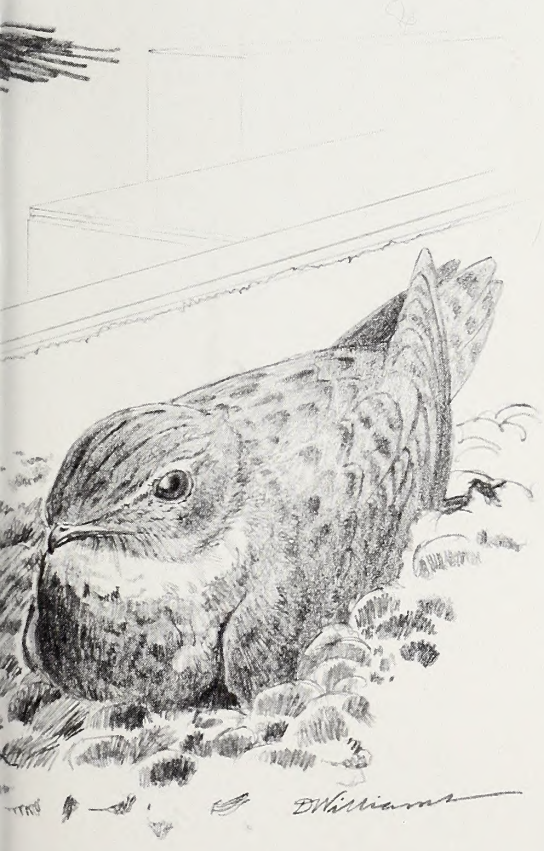
The female nighthawk is rather casual about nesting. She merely scoops a shallow depression in sand or even gravel, and lays her two eggs there. She'll incubate them for about 19 days, and both parents will feed them for the next month. The young birds' coloration blends into their surroundings, making them hard to spot, and they freeze instinctively when threatened. These traits have helped the species survive.

By day, nighthawks rest on the ground or in trees. Because they have only rudimentary feet, they cannot grip twigs for support and must sit lengthwise on branches. Brown and black are its main colors, but you'll know a nighthawk when you see its white throat and the distinctive white bars across each wing and across the tip of the tail.

Nighthawks have blended into man's surroundings pretty well. Our flat roofs in urban areas offer a good surface for the minimal nesting needs of the bird, and our high-powered lights above such places as softball fields attract plenty of food.

Second base by night is a fine perch from which to look at our booming bullbats of the night.

***A nocturnal hunter**, the nighthawk feeds on all kinds of insects, including mosquitoes. This South American migrant is not really a hawk, but a member of the nightjar family. It appears in North Carolina in mid-April, and can be seen in the twilight hours darting for bugs near high-powered lights.*



***The nighthawk** is one bird species that adapts well to urban areas. For its nest, it will scratch shallow depressions in woodland soil, but it readily nests on flat, gravel-covered roofs in cities.*

MARLIN IN TROUBLED WATERS

White marlin catches continue to decline, and the future of all billfishing is uncertain. Part of the problem is inadequate oceanic fishery management.

written and photographed by Joel Arrington

We had chartered months before, and the date fortunately fell between September nor'easters at Oregon Inlet. The forecast was for light wind and calm seas. At daybreak, big diesels rumbling, the sportfishing fleet departed the marina one by one.

The lurching boats diverged after crossing the inlet bar to run a few points north or south of east. The destination was a region about 25 miles off the inlet that over the past two days had, for obscure reasons of bottom contour and surface temperature, held concentrations of white marlin. Some of the boats had also caught sailfish and blue marlin.

It was an hour and a half at 4200 rpm before the skipper throttled back and the mate began putting overboard the baits he had rigged on the way out. They were ballyhoo on 6-foot wire leaders and 7/0 hooks. Each baitfish was finished with a colorful rubber skirt.

We fished two 20-pound and three 30-pound class rigs that day for the white marlin, only one 80-pound rod for the chance — a pretty good one — that we might raise a blue. It was baited with a 2-pound Spanish mackerel. We buckled on fighting belts to play the whites while standing.

The bally raised billfish within the hour. Someone released a sailfish after a 10-minute fight on 20. Before noon we had released two white marlin and boxed a wahoo and two dolphin.

The wind freshened after lunch and seemed a little cooler. Schools of pilot whales migrated through. Ahead birds dived over bait. We worked alongside them and suddenly we were beset with marlin in the baits. Shouting, we jumped from rod to rod as bills and fins appeared behind the skipping bally. At one point we had three fish on at once, all going in different directions. Of those, we released two. One released itself.

Before heading in at 3 p.m., we caught two more whites and failed to hook a blue that crashed the Spanish. The mate ran six white marlin and one sailfish release flags up the outrigger to snap triumphantly in the freshening wind as we cruised under Oregon Inlet bridge. The next day it blew 40 miles per hour.

***A white marlin** skitters across the sea off Oregon Inlet. Catches of these billfish have been declining in the Atlantic in recent years. Efforts to pinpoint the causes have been hampered by an inadequate collection of information.*

That was in 1978, the high point in North Carolina white marlin runs in modern times. That year 718 anglers won citations for whites in the state fishing tournament. The number declined annually until last season, when it turned up slightly and reached 195, still only 27 percent of the 1978 high. Sailfish and blue marlin catches in the tournament have remained relatively level, but white marlin catches are down in most of the world's fishing ports.

If they could, many recreational anglers would fish only for billfish. The offshore pelagics with elongated upper mandibles are unchallenged at the top of the offshore game fish hierarchy everywhere in the world. Enormous sums have been and are being lavished on their pursuit wherever there is even a remote chance of catching one.

What are one's chances, these days, of catching a billfish? It depends on the species, the season, the location and the angler. The National Marine Fisheries Service measured blue marlin hooked per unit of effort (HPUE) during 1985 billfish tournaments from North Carolina to Georgia at .016. That is 16/1000ths of a marlin per hour, or a hooked fish for every 16 hours of fishing. Many get off, so the number of fish actually caught, particularly big blue marlin, is far less than that.

HPUE in National Marine Fisheries Service reports is an average for a region among fishermen who are trying specifically to catch billfish. The averaged success of everyday charters and private boats not targeting billfish particularly would presumably be much less. Waters off the North Carolina Outer Banks are especially productive of marlin, relative to the whole Atlantic coast, so your chances here are better than, let's say, off St. Simon's Island, Georgia.

Good angling teams beat the average all hollow. They are especially adept at raising fish when less experienced fishermen cannot, and at hooking fish that come into the baits. There is huge potential for bad luck and many opportunities to slip up before the mate can touch the leader and count it a caught fish.

Over the 13-year history of the North Carolina Salt Water Fishing Tournament, anglers caught four times as many white marlin as blue marlin, but about the same number of sailfish as blue marlin.

Sails, the smallest and, in some years, the least abundant of the three common billfish off our coast, often arrive off North Carolina later in the year than the others. Sailfish of over 120 pounds from the western Atlantic have been caught, but catches commonly range between 20 and 60 pounds. The North Carolina record weighed 80 pounds and was caught by Joseph L. Stalnaker in 1974 off Oregon Inlet.

On this side of the Atlantic, the greatest concentrations of sails are off northern Florida in winter. Some of these fish migrate to North Carolina and beyond, the first arriving here usually in May. The months of highest population may be August and September.

Named for its spectacular dorsal fin, sailfish are tough fighters on appropriate gear, usually highly acrobatic when hooked. Tackle balanced for 20-pound test line and less, down to about 10-pound test for the most experienced anglers, is recommended. Florida anglers employ live baits mostly, and king mackerel fishermen trolling live baits here sometimes take sailfish. Nevertheless, trolled dead baits are the attractor of choice in North Carolina. Small bally, the frozen bait shipped up from Florida and the tropics, is no doubt the most popular bait here.

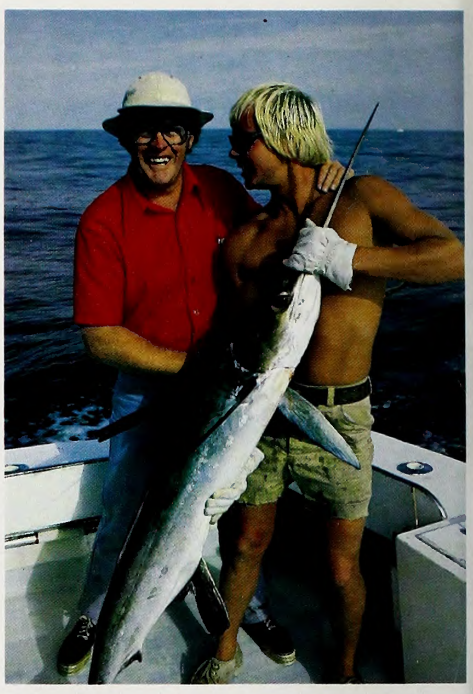
White marlin are the welterweights of billfish, seldom exceeding 80 pounds, but the world record caught off Brazil topped 181 pounds. Ethel B. Cootes set the North Carolina mark at 118½ pounds, also off Oregon Inlet, in 1976.

Throughout their range, white marlin are usually found in deep blue, warm water like the Gulf Stream. However, off Virginia and northeastern North Carolina, well inside the Gulf Stream in water about 120 feet deep, there is a major western Atlantic concentration area for white marlin in late summer. A combination of ideal temperature and plentiful bait attract white marlin here in late August and September, although they are present elsewhere off North Carolina at least from May through October. Anglers out of Rudee and Oregon inlets have enjoyed some of the best billfishing in the world in years when white marlin populations have been high.

For a few days between late summer northeasters, white marlin may "ball" bait off the northeastern coast. Several — or in some cases, many — whites will circle bait schools, cutting into them to feed. At these times, anglers often catch and release many marlin. I recall one boat years back at Oregon Inlet returning with 26 release flags flying. That may not be the record.

For most people, appropriate tackle for whites is balanced for 30-pound test line down to about 12-pound test for skilled anglers. You don't need the heaviest reels if yours will hold 300 yards of line.

A good many experienced fishermen prefer white marlin to any offshore fish. In late summer, chances of hooking several a day are good, though much diminished lately. The fish are big enough to challenge even a strong angler — yet without the risk of an all-day battle, as often occurs with blue marlin — and the aerial display is as showy as that of any fish.



***The mate** on a charterboat holds up a white marlin for a happy angler. Sportfishermen release most of the white marlin they catch, and their impact on these gamefish is considered minimal.*

Blue marlin are heavyweight bruisers among gamefish off the North Carolina coast. Average weight of males and females combined caught in our waters varies around 300 pounds, but the big fish are almost always females. North Carolina's champion weighed 1,142 pounds when it was caught by Jack Herrington off Oregon Inlet in 1974. It was the world all-tackle record for a time, but the current mark now for Atlantic blue marlin is 1,282 pounds from the Virgin Islands in 1977.

Several blue marlin estimated in that size class have been lost off North Carolina, some after long battles.

It is the daily potential of hooking a fish weighing upwards of half a ton that forces anglers to use tackle that is far too heavy for white marlin and sailfish, not to mention the everyday run of wahoo, king mackerel and dolphin. Typically on charter boats you find 50-pound class reels about half loaded with 80- to 100-pound test monofilament. This gives the average customer, who doesn't know to spread the line as it comes on the reel, a reasonable chance to boat at least a small to average blue marlin without risking jamming the reel with a pile of line in the

***The silvery bulk** of a white marlin appears alongside in the cobalt blue of the Gulf Stream. These billfish are favored by offshore light tackle enthusiasts because most weigh less than 80 pounds, while their larger blue marlin cousins average about 300 pounds and sometimes top 1,200 pounds.*

middle of the spool. Unfortunately, it takes much of the pleasure out of catching 95 percent of the other fish he is likely to hook.

Billfish are highly migratory, most species traveling thousands of miles in their lifetimes. That makes determining population levels difficult. When white marlin catches are down off North Carolina, does that mean the whole world population is suffering, or that the fish that had been summering off our coast have just gone somewhere else for awhile? Populations of all fish vary, but how much variation is normal and natural? No one can say for sure. We need to see a global picture, yet many nations collect no fishing mortality data, some collect it poorly, others collect it, but are slow to share it.

Not many commercial fleets target billfish directly. However, when fishermen set miles of longlines with millions of hooks for tuna — as hundreds of ships from several nations, including our own, are doing in increasing numbers every year — there is an inevitable billfish by-catch. How significant it is we don't know because we don't see the big picture. Usually marlin are dead when they are taken off the droppers, so releasing them doesn't help.

Sport fishermen are generally willing to do their share by releasing most of their billfish. During 13 years of the North Carolina Salt Water Fishing Tournament, anglers released alive 46 percent of the sailfish, 68 percent of the blue marlin, and 80 percent of the white marlin. Sport fishermen and conservation groups all support releasing fish, an idea that earnest desire to help and constant preaching in the outdoor press have made doctrine. The truth is, if every billfish caught on sporting tackle were killed, the total would be only a small fraction of the commercial catch. There is little, in fact, sport fishermen can do on a local level to have much effect on billfish populations. International, or at the very least, regional approaches are the only ones that have any chance of making a difference.

The National Marine Fisheries Service has fallen short in its efforts to collect comprehensive data on billfish catches, but last year it was instrumental in bringing about the most important action so far in billfish conservation. The Madrid-based International Commission for the Conservation of Atlantic Tunas (ICCAT) approved a U.S. proposal for a long-term billfish research program. It will include tagging and port sampling studies as well as monitoring Caribbean longline activity with onboard observers. It was the first ever cooperative international effort on behalf of billfish.

Populations can rebound quickly, so there is hope that we will again see the former numbers of white marlin off our coast. But until we learn more about billfish mortality and global populations, we will just be groping in the dark. ⊠

PROTECTING WETLANDS
PART 1

WETLANDS AREN'T WASTELANDS

Once considered worthless, North Carolina's vast wetlands are now recognized as priceless resources. This is the first of a series of articles on the status of wetlands in North Carolina. Where are our wetlands and why are they so valuable? Do our laws protect them sufficiently? What can be done to strengthen wetland protection? These are some of the questions this series will examine.

by Lawrence S. Earley

It is highly important that (swamps) be brought into cultivation, and we have no doubt that large tracts which are classified under the term, swamp lands, are to become the best in the state for the growth of cotton.

— Ebenezer Emmons, *The Swamp Lands of North Carolina* (1860)

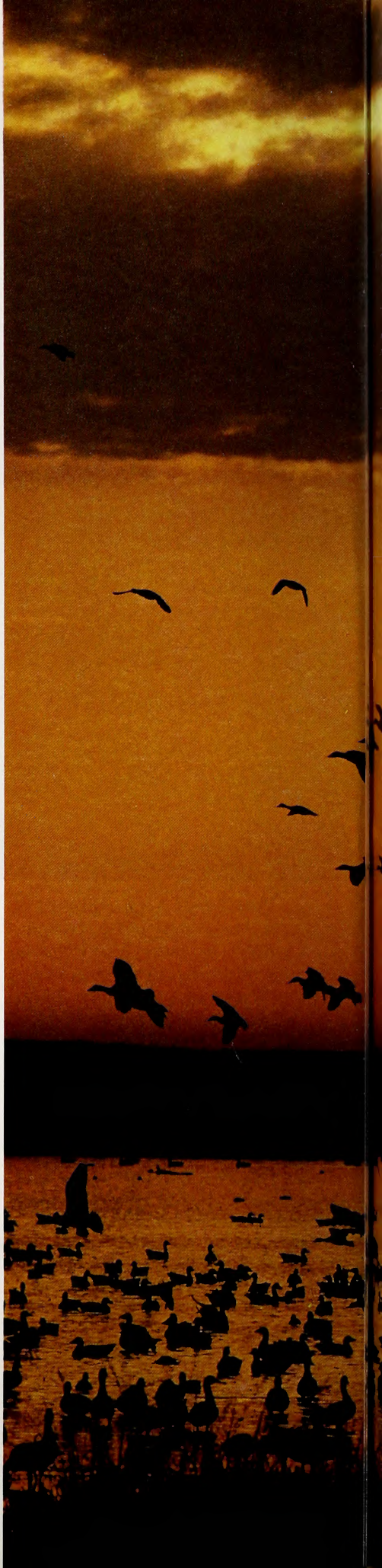
I'd like to have a chat with that old swampbuster Ebenezer Emmons. Ebenezer, I'd say, you don't sound like one, but I have a hunch you've got the makings of a good conservationist.

Ebenezer was a scientist, you see, progressive and forward-thinking for a man of the mid-19th-century. As the state geologist surveying potential agricultural lands in the east, Emmons had a big problem — how to convince farmers to cultivate their swamps. In his day, the swamps of eastern North Carolina must have been formidable indeed. Greatly diminished today, they still make up a powerful statistic, although we call them "wetlands" now. Today, says the U.S. Fish and Wildlife Service, North Carolina ranks third among southeastern states in wetland acreage (5,690,000), fourth in the percentage of land taken up in wetlands (16.9 percent). One 1962 study estimated that nearly 95 percent of these wetlands were in the 41 easternmost counties. Broad rivers flanked by swampy floodplains meander all over the flat coastal plain. Other land forms soak up water like a sponge. Peaty pocosins. The mysterious, oval-shaped Carolina bays. The rolling marshlands along the sounds.

Nearly everywhere he went in the east, Emmons found wetlands and people who shook their heads and said, "You can't do anything with them swamps. Wastelands is what they are. You get near 'em and you sicken. You die."

But Emmons' analysis of swamp soils convinced him that swamps weren't wastelands, that they could be cultivated, and that people who did so ran no more risk than other farmers. Don't let them sit there, he said. Put them to work.

That was progressive thinking in 1860. Today we know that wetlands are already at work, that they are some of our most valuable natural resources, that they do more good for you and me in their natural state than we could do by "improving" them with



***Wetlands have** important values for wildlife, especially waterfowl. Backwater sloughs in bottomland hardwood forests are crucial winter habitat for migrating ducks. Wetlands also serve as travel corridors for wildlife.*

EUGENE HESTER

something new. And that they are well worth protecting. I suspect the scientist in Ebenezer would respond to what we now know.

To give him a chance to change his mind about wetlands, I'd take him to a few of my favorite spots. Follow the sun from east to west. A sort of wetland sampler through the seasons. I'd show him the sights.

Ebenezer, I'd say, let's get wet.

Salt marsh, Brunswick County.

Watch me hunker, Ebenezer. This is how you watch a black skimmer unzipping the water in the marsh creek. Bright sun, blue sky. We're right down the way from Calabash (maybe we'll get us a seafood platter after we've messed around here). Listen hard — by walking on the root stalks of marsh grass, we've crept so close to the creek at low tide that we can actually hear the skimmer cut the water with its lower mandible. One false move, and we'll be up to our knees in mud.

This low tide is important. It gives the marsh soil a chance to breathe in some oxygen. Later, a rising tide will bring in new food, float out plant and animal wastes.

And notice this sea of waving marsh grass all around us. Botanists call it *Spartina alterniflora*. It gets doused with salt water twice daily but thrives. An interesting plant. It's practically inedible while alive, but when it dies it forms the base of one of the most diverse food chains in nature. Tiny crustaceans climb aboard the rotting pieces of grass and break it down into smaller pieces. Joining with the floating algae in the water, it becomes a nourishing broth for larval shrimp and young mullet. These creatures draw blue crabs, trout and flounder. Bluefish and croaker eat shrimp and mullet. Salt marshes are incredibly fertile nursery areas for fish and shellfish. Our $400 million dollar commercial fishing industry depends on them.

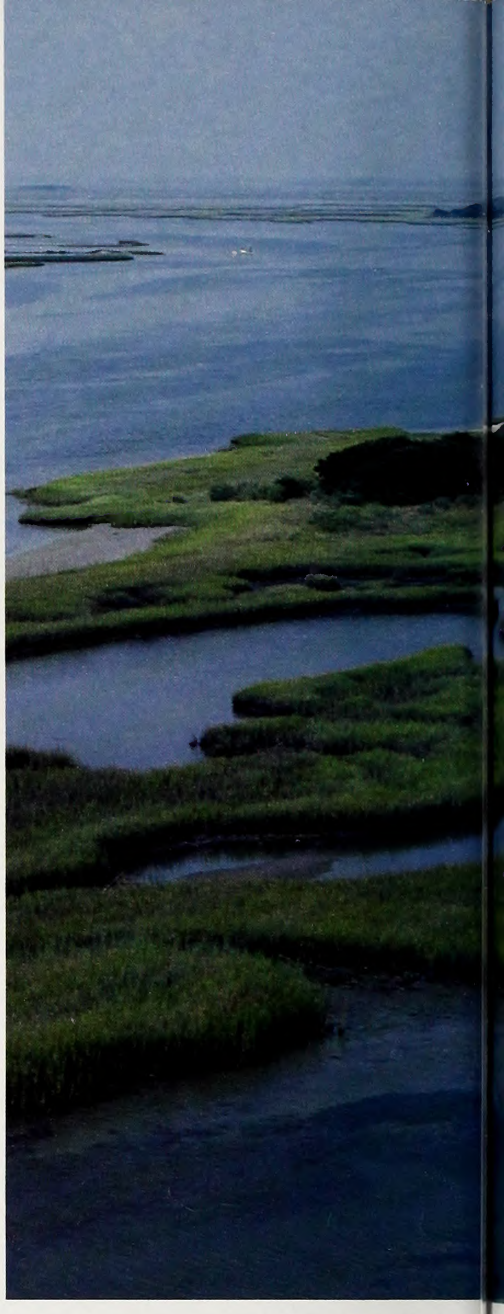
If we stayed here all day, perhaps we'd sense some of the other marsh players around us. See the courtly movements of a great blue heron as it fishes the shallows. Hear the crazed call of a clapper rail. If we stayed all night we'd meet a raccoon or two. In winter we'd see ducks and geese fall out of the sky, migrants on their long journey from Canada. The salt marsh teems with wildlife.

But we've got other wetlands to see, so let's move on.

Pocosin, Croatan National Forest.

Good Lord it's hot! A June afternoon. A sizzling 95 degrees. We've just motored five miles by a small, gasoline-powered railroad car deep into the Croatan. And now the breeze has stopped and the heat and exertion is staining our shirts with sweat. How you doin', Ebenezer?

This is a different kind of wetland. The word pocosin is an Indian word. Means "swamp on a hill." You won't find much open water here, no fish, no marsh grass. The soil gives the wetland away, though. It's springy, spongy. You feel as if you could break through this mat by jumping up and down. If you did, you'd be up to your ears in peat, perhaps over your head. Peat is an organic soil consisting of dead plants that



***Summer green** of saltwater marsh is picturesque, but these coastal wetlands hide important processes. Marshes are vital habitat for young fish and shellfish during vulnerable early weeks. Marsh grass also supports the food chain for many fish and wildlife species in and around the estuaries.*

A Wetlands Fact Sheet

- The southeastern states comprise only 16 percent of total land surface area, but contain 47 percent of all United States wetlands.[1]
- The southeastern states contain 79 percent of all salt marshes, 65 percent of all swamps, bottomland hardwoods and bogs, and 22 percent of inland freshwater marshes.[1]
- Fifteen percent of the southeastern United States land surface area is wetlands.[1]
- North Carolina ranked third among southeastern states as of the mid-1970s in the number of wetland acres (5,690,000), and fourth in the percentage of the state in wetlands (16.9 percent).[1]
- Studies from 1967 to 1982 estimate these acreages for different North Carolina wetlands:
  - natural pocosins (602,134)
  - bottomland hardwoods (2,691,989)
  - shallow fresh marsh (47,016)
  - salt marsh (113,558)
  - deep swamps (450,255)[2]
- North Carolina has 70 percent of the nation's pocosins.[3]

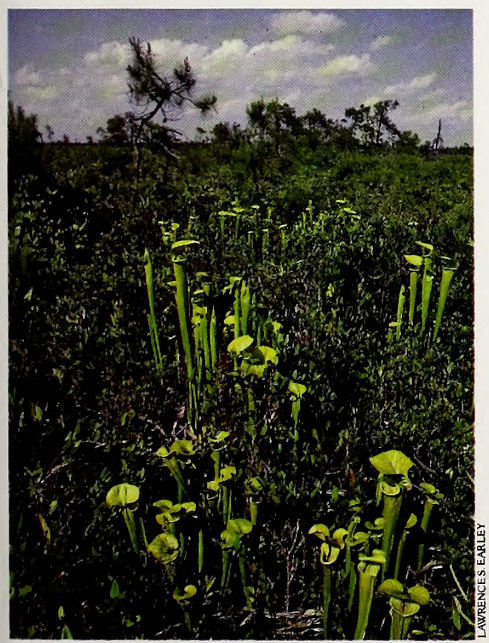
Sources:

[1] John M. Hefner and James D. Brown, "Wetlands in the Southeastern United States," *Wetlands*, vol. 4, 1985.

[2] Curtis J. Richardson, Jack P. Royer, "Wetland Trends and Factors Influencing Wetland Use in North and South Carolina." Office of Technology Assessment, Washington D.C., July 1983.

[3] *Wetlands: Their Use and Regulation* (Office of Technology Assessment, Washington D.C., March 1984).

JIM DEAN



LAWRENCE S. EARLEY

***Pitcher plants** in foreground grow in thick patches in low portion of a coastal pocosin. The peat-rich pocosins buffer freshwater drainage into salinity-sensitive sounds, an important service for the state's commercial fish industry.*

rot slowly in the acid environment. The peat measures nearly 12 feet in spots.

The spongy peat soil in this pocosin performs a valuable service to nearby Pamlico Sound. It absorbs the heavy rains that afflict the area, and soaks up runoff from inland areas. It stores it for weeks, even months and then releases it slowly to the sound like a skinflint. This slow and controlled flow helps maintain the sound's delicate mix of salt and fresh water that is crucial to fish life. Too much fresh water, and the mix is wrong. The fish go elsewhere or they die.

We're pushing through titi and gallberry — wetland vines. We see pond pines, various bay trees, all wetland trees. The soil underfoot can be like tinder in the higher areas but oozes with water in the low parts. Here's a little lowland. It's profuse with the fleshy tubes of pitcher plants, another sign that we're in a wetland with scarce nutrients. There are a few deer here, not very many and kind of stunted — the close-knit vegetation hampers deer and there's not a lot of food for wildlife.

But if we had more time we could wait out a black bear — they're making their last stand in the thick and inhospitable (to man) pocosins. Imagine, Ebenezer — bears waiting out their end in such surroundings.

Let's move on to an inland wetland.

Bottomlands, Roanoke River.

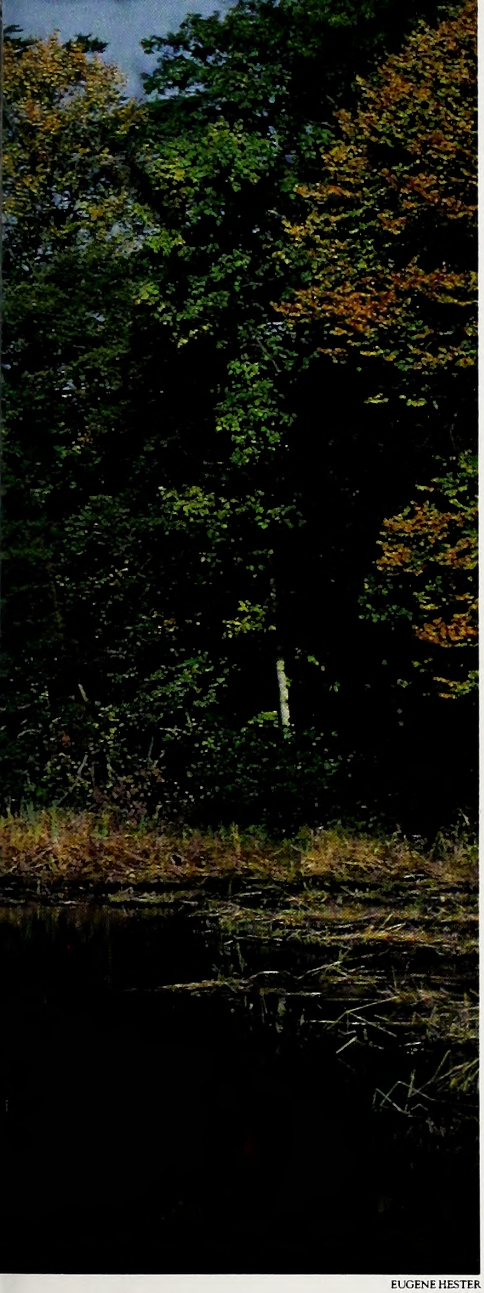
Whoa! Look there, Ebenezer!

It's easy to get excited when you catch sight of a flock of 20 wild turkeys through

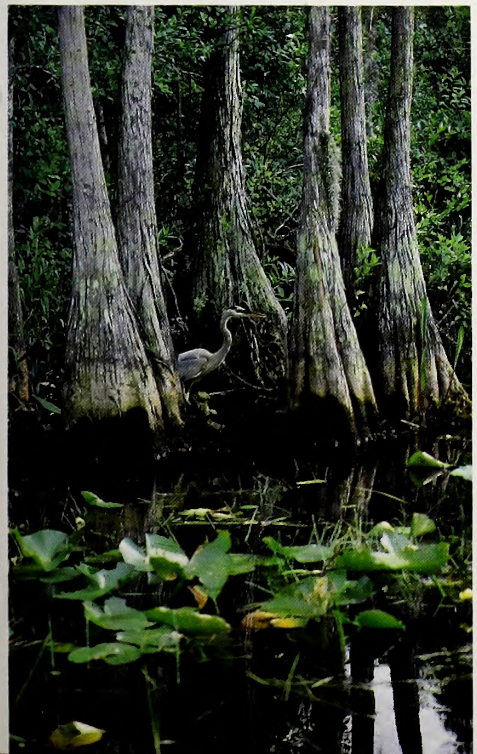
Freshwater marshes *like this one have shown ability to improve the water quality of riverine systems. Nationally, freshwater marshes have been used successfully to treat effluent from sewage-treatment plants.*

CURTIS WOOTEN

The American alligator *is only one of many endangered species that require wetlands for their survival. Other wetland creatures are the bald eagle, red-shouldered hawk, bog turtle and pine barren treefrog, not to mention many fish species.*



EUGENE HESTER



EUGENE HESTER

***Great blue heron** strikes a classic pose within the haunting realm of a gum-cypress swamp. Wetlands are favorite recreational spots for hunters, fishermen, birdwatchers and canoeists.*

an opening in an oak grove. That's the second large flock I've seen in the last 15 minutes. On a cold January day it's best to take in the extent of the Roanoke's vast bottomland hardwood forests from a car and we've been doing a lot of whoaing and whooing while looking out our closed windows. There are oaks as big as a garage. Hickories. Ash.

We drop into a gum-cypress swamp. There's a water line on the trees, a yellowish scum that marks the high point of the last flood. Floods inundate the swampy areas of the floodplain often during spring and winter, and are the life blood of a bottomland. That's why we're seeing such a rich profusion of trees. Fertile soil carried by the flooding river spreads over the flood plain and supports a luxuriant growth. Oaks drop their acorns, sweet gum their seeds. Berries grow everywhere.

The bountiful food attracts prodigious animal and fish life. Enormous deer herds. Wild turkeys. Thousands of migrating waterfowl winter in the flooded sloughs of riverine swamps. Migrating hawks follow the river south, swooping down to feed on their way. Herons nest deep in the woods. Rare Mississippi kites are at their northeastern limits here. The Roanoke is one of the richest bottomlands in the state, but most of our rivers still have important bottomlands.

The seasonal flooding also links these multiple habitats to the Albemarle Sound, miles below us. The flood waters lift some of the dead and decomposing organisms from the forest and swamp floor and float them down the Roanoke and into the sound. A precious cargo. More organisms from upriver mean more food for fish and shellfish. So much depends on a wetland.

Let's go west, Ebenezer!

Fen, Bluff Mountain (Ashe County).

We break out of the woods and step into a three-acre basin flooded with late-September sunlight. The Bluff Mountain fen. A fen is a sort of bog with some differences. It's the only one in the state, Ebenezer. North Carolina's nonpareil. We walk the boundaries, following the trail. The transparent heads of cottongrass explode in the slanting light.

We've come 4,500 feet high up the Blue Ridge Mountains to marvel at this little wetland jewel. Wetlands are not all in the

The bountiful food attracts prodigious animal and fish life. Enormous deer herds. Wild turkeys. Thousands of migrating waterfowl winter in the flooded sloughs of riverine swamps.

east. They don't have to be broad or extensive. They can even be smaller than this, but none would equal the accolades heaped on this diminutive spot. One hundred and forty species of plants and mosses growing in an area a little larger that a softball field. There's an insectivorous sundew growing amid the Appalachian peaks that also grows in an eastern pocosin. There are northern relicts, Ice Age orphans that sprouted here. Rare and endangered species cheek by jowl.

Water seeps from springs and passes through the fen and over the mountain. It's loaded with nutrients from the mineral soils and the rocks. That's why the fen is so rich in botanical delights. In Transylvania County, other wetlands called mountain bogs are nutrient poor because they are watered only by the rain and snow. You'll find pitcher plants there and other signs of a nutrient-poor soil. But the Bluff Mountain fen has got nutrients to spare and supports a freight-load of plants with its slowly moving underground watering system.

These are only some of the wetland types we have, Ebenezer, as different as anything can be. They encompass a three-acre mountain fen and a pocosin that measures in the thousands of acres. Their atmospherics are different too — the dark, hooded shadows of a cypress swamp contrasting with the sunswept terrain of a salt marsh. There are other kinds of wetlands across the state's vast topography. Freshwater marshes along rivers and streams. Beaver ponds. Millponds. Lakes, rivers and streams.

They share complex processes that link them to our abundant wildlife heritage, to our commercial fishing industry, to the richness of our botanical diversity. And what we've learned about wetlands goes far beyond what you, Ebenezer, good scientist that you were, even suspected in your day — far beyond what most of us even suspect

Wetlands share complex processes that link them to our wildlife heritage, our commercial fishing industry, the rich diversity of our plant life.

Morning mist shrouds *a beaver pond. Although most wetlands in North Carolina are natural, many are man-made or made by beavers. Beaver ponds are some of the most important wetlands in the interior of the state — habitat for waterfowl, furbearers and a host of wetland-associated wildlife.*

EUGENE HESTER

LARRY DITTO

***Tundra swans glide** to a landing at Lake Mattamuskeet. Wherever water is, wildlife exists in abundance. The loss of wetlands throughout the state is cause for alarm among many wildlife enthusiasts and conservationists.*

today. Consider these good works, performed for free by our many wetlands:

Wetlands reduce flood peaks. Forested flood plains provide a wider channel for rain-swollen rivers, actually slowing the river's velocity. Most flood plains store excess water during flood stage and then release it gradually over time. The ability of a riverine wetland to do this, of course, depends on the size of the forested flood plain (the larger the better) and the soil type (the more porous the better). Filling or clearing a wetland destroys its ability to reduce the destructive effects of flooding.

Wetlands improve water quality. Man fouls his rivers with pollutants — sediments, toxic chemicals, disease-causing microorganisms and excessive nutrients — but wetlands help clean them up. You'd pay good money for a service like this.

Floating sediment is a hazard. It fills in reservoirs and streambeds, reduces fish foods, covers spawning beds and suffocates fish. Nitrogen and phosphorous wash off fertilized fields and are part of the effluent from wastewater-treatment plants. These nutrients cause lakes and sounds to bloom with green algae, robbing oxygen from fish and eliminating important parts of the river's food chain.

But wetlands can at least help. Wetland depressions can act as basins where sediment in a river settles out. Wetland vegetation also traps floating particles. In experiments in North Carolina as well as other states, some wetlands — notably cypress swamps, salt marshes and freshwater marshes — have been used to treat wastewater from water-treatment plants. These wetlands have shown potential in reducing the load of phosphorous and nitrogen before the water enters the river.

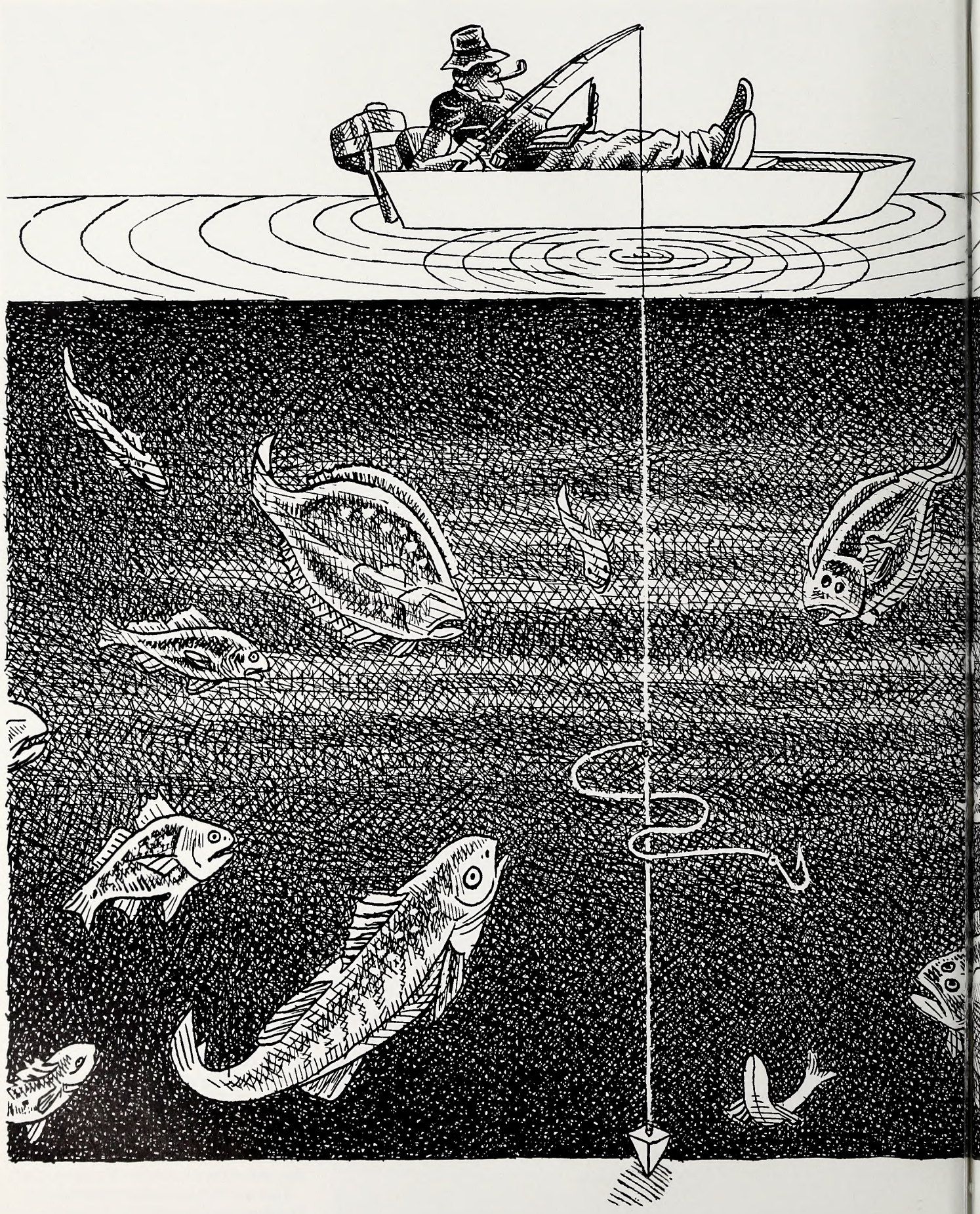
Wetlands help stabilize shorelines. A cleared floodplain will erode more sediment into the river than a forested floodplain. Plants and their root systems stabilize the soil. Planting marsh grass has been shown to reduce shoreline erosion in salt marshes.

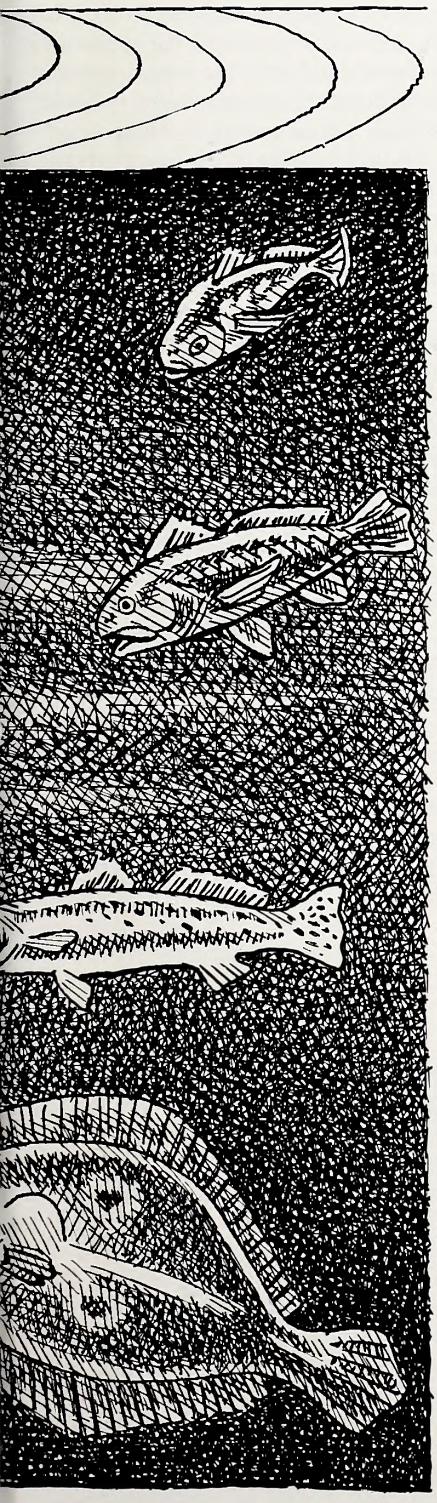
Wetlands recharge groundwater. Some studies have found that water percolates through wetland areas to refill aquifers lying deep underground. Wetlands may contribute importantly to maintaining groundwater levels in certain areas, especially along steep mountain rivers and streams.

These are pretty strong reasons for protecting our marshes, pocosins, bottomlands, swamps and bogs. But I think most people still think wetlands are wastelands, Ebenezer — good to fill in for a road, for growing pine trees, for erecting beach cottages, and not much good for anything else.

Dr. Albert E. Radford has a perspective on this. Radford is a professor of botany at the University of North Carolina and a longtime proponent of protecting a wide diversity of habitats. "I feel that when we use wetlands," he says, "we are really moving into something we don't know what we are affecting... Plants are affected. Animals are affected. We know so little we don't know what damage we're doing. I feel until we know, we have a moral obligation, a stewardship obligation to protect at least part of it."

That may be something to think about, Ebenezer Emmons. ⊠





In Praise Of BOTTOM FISHING

There are many fishermen who cling to this most pure, most productive form of angling. These excerpts are reprinted from the author's 1983 book, *The Even-Tempered Angler.*

by Louis D. Rubin Jr.

I write in praise of the art of bottom fishing.

I would meet you upon this honestly.

As an art form, bottom fishing is practiced more often, by more fishermen, than any other kind of sport fishing except that with cane pole and bobber. And unlike the latter, it is done not because it is the only kind of fishing available to the fisherman, but because the fisherman very much wishes to do it that way. A bottom fisherman, being generally wise and virtuous, prefers bottom fishing to all other kinds.

Yet somehow the art of bottom fishing has never had its proper chronicler.

It is time that the traditional claims to superiority of other forms of fishing — for trout, salmon, black bass, marlin, others — be exposed for the half-truths, untruths, and legerdemain involved in their advocacy. It is time that the whole truth of the matter of fishing be set forth.

For bottom fishing is no mere avocation, rationalization, or even technique. It is a distinctive way of looking at the world.

I wish, therefore, insofar as I am up to it, to speak for bottom fishing and for bottom fishermen. Like Homer and Melville, I propose to invoke the muse in their behalf.

ILLUSTRATIONS BY STEVEN CRAGG

© 1983 by Louis D. Rubin Jr.
Excerpted from *The Even-Tempered Angler,* published by Nick Lyons Books, 31 West 21 Street, New York, NY 10010. $12.95 Hardcover.

Now gods, I say, stand up for bottom fishing.

Picture to yourself a river — let us say one of those that flow into a bay such as the Chesapeake. At its mouth it is very wide, and all along beyond where the salt water turns brackish, it stretches a half mile or more across. There are trees, oaks and pines, along either bank and, between the solid land and the open water, expanses of marsh grass, with here and there small islands in the reeds. Tidal creeks lead through the marsh. The channel of the river is eighty feet deep or so, and perhaps a couple of hundred yards in width. Sloping up from that channel on either side, in gradual ascent, are vast acres of submerged sand and mud, not stretched out to an even smoothness but arrayed unevenly, in little islands, channels, and flats visible on a nautical chart but hidden beneath the surface of the water.

Take a boat trip along that channel and you will see stationed here and there, in clusters or alone, people anchored in boats. What they are engaged in doing is bottom fishing. They are there because they know that on the incoming or a slack or flood tide schools of fish will be cruising along the edges of the channel in search of food. But the fish will not fan out uniformly as they go; instead they will seek out the sloping bank, the underwater island or crevice, the submerged creek bed where their own prey are likely to be swimming. What the bottom fisherman attempts to do is to locate his boat directly above such a spot, so that he can lower a baited hook down close to the bottom, where it will be more than ordi-

narily apt to attract the attention of the fish. To be anchored there, at the right time and place, is where much of the craft of bottom fishing comes into play . . .

Yet in thus describing where bottom fishing is customarily done, I have perhaps distorted what in essence it is, for I have had to emphasize the searching, the active seeking for locations where the fish are to be found. Such exploration is necessary, but it is preliminary. It is what is done in preparation for bottom fishing; the bottom fishing itself does not involve any such searching. *The art of bottom fishing is that of letting the fish come to the fisherman, instead of vice versa.* The bottom fisherman must be envisioned as one who is in a state of repose; a watchful, waiting repose, not an idle slothfulness. The bottom fisherman is no lazy man who has chosen to go fishing in order to do nothing in a socially acceptable form. He fishes the bottom because that is how fishing is best done . . .

Let us begin with the logic of the matter, inquiring as to what the practice of fishing should by rights offer its practitioners, and demonstrating, *q.e.d.*, that of all forms of fishing it is bottom fishing that most abundantly fulfills those requirements. Now the first, the primary requirement of a mode of fishing is that it offer the distinct possibility at least of actually catching fish. This may seem obvious, but it is not. A dedicated bass fisherman, for example, will drive 50 miles to a manmade impoundment, trailing $10,000 worth of equipment-crowded bass boat behind his automobile. He will launch his boat, and spend a long day on the water moving at high speed from one place to the other, repeatedly casting plugs at the banks, carefully checking out underwater structure at various depths and of various kinds, making sure to cover all the points of land that slope down into the lake from shoreline to far out under the water, when almost from the outset he is all but certain that no fish worth the taking will reward his efforts that day. Because of barometric pressure, condition of water, or whatever, the bass simply are not feeding, and nothing that he does can make them change their minds. That such days not only exist but occur with regularity, any bass fisherman knows very well. "You should have been there yesterday," he will be told, or, "they were really hitting last week."

The enormous body of literature promulgated by the manufacturers of plugs, plastic worms, spinners, rods, reels, electronic fish-finders, temperature gauges, oxygen meters, electric trolling motors, high-horsepower outboards, and costly high-speed bass boats will never admit to the likelihood of such conditions, of course. The magazines that bass fishermen read all maintain a studied conspiracy to deny that no-fish days can happen, if the fisherman knows what he is about *and if the proper equipment is purchased and used.* Yet they can and do happen, and with appalling frequency.

It is very much the same with what is supposedly the purest, highest fishing art form of all, angling for trout and salmon. This fisherman does not employ the ostentatious electronic and mechanical paraphernalia that so delights the bass fisherman. His yen for materiality and conspicuous consumption finds expression in the expensive rods he purchases and in the elaborate patterns, types, and sizes of the artificial flies he employs, often tying them himself. His art is one of "matching the hatch" — presenting to the finicky-feeding trout an artificial fly that when it floats upon or is carried beneath the water will resemble the particular insect on which the trout is feeding that day. Yet, on how many days will the trout not be feeding on any insect at all? The fisherman will wade for miles along a rushing trout stream, stepping carefully upon an uneven, treacherous streambed, assiduously casting away with his fly rod, to no avail whatever.

Cleverer than the bass fisherman, the trout and salmon fisherman cunningly strives to make a virtue, a fetish even, of this habitual scarcity, if not entire famine, of catchable fish. Trout fishing is enjoyable, he says, not in spite but because of the difficulties it presents. The fewness of the fish is laudable because it tests the angler's skill and devotion. As if the fish were only an intriguing, desirable, but not an essential element in a day's adventures in wet, green places! As if the object of going fishing were not, after all, to catch fish!

Now there are days, sometimes, when the bottom fisherman must also go fishless. But how few and far between they are! To a far greater degree than any other kind of fishing for pleasure, the art of bottom fishing involves the actual catching of fish. It is not the arduous preparation, the operation of mechanical gadgetry, the frenetic going about on boats at high speeds, the elaborate duplication of insects with fly-tying materials and the delicate presentation of such objects to the fish, that constitute its principal activity, but the taking of fish. Thus, of all varieties of sport fishing it is the most elemental, and, for all that its devotees use cut bait, worms, and dabs of crab instead of man-created decorative objects, the purest in form.

Catching fish, however, is not the sole object of fishing. If it were, the most enjoyable form of sport fishing would be setting out seine nets, otter trawls, and trot lines. Fish must be caught, not harvested. There must be finesse involved; the intellect must be tested.

It is for this reason that the trout fisherman, *vanitas vanitatis*, considers himself supreme among anglers. He pursues not fish in general but an individual fish, a single wary brownie or brookie, lurking near a rock 50 feet away, and stalks it in its native lair, making sure that his shadow does not slant across the water to spook the prey. Attaching precisely the appropriate fly, which he himself has manufactured, to a

2-pound-test tippet, he presents the fly to the trout via a skillful flick of his fly rod. Patience, finesse, intelligence triumph: the wily trout is fooled; it rises, assails the fly. The hook is set, and for 10 glorious minutes the angler plays the trout, regaining line, letting it strip off, never permitting it to slacken, yet taking care not to let the battling trout exert so much pressure that the 2-pound-test tippet is parted. Ultimately the fish, that valiant adversary, is brought close enough to where it can be netted, and the triumphant fisherman lifts a handsome 3-pound brook trout out of the cold water. What could be more demanding, more satisfying that that? In the words of Roderick Haig-Brown, "the challenge is not: 'Can you catch him?' It is rather: 'Can you catch him in the way you want, with fullest respect for his qualities and a real testing of your own skills?' "

How very convincing. Yet ask yourself what has transpired. Isn't there something rather arbitrary and unnatural in deliberately creating a situation in which one must play a 3-pound fish for 10 minutes in order to keep it from snapping a 2-pound-test leader? And exactly what has been proven by insisting that the fish strike only an artificial fly, when that same trout would hesitate not a moment before engorging a live minnow, a worm, or even — so uncritical are trout where matters of diet are concerned — a kernel of corn? Is this truly *fishing*, or an elaborate ritual in which the fish is only the excuse, involving doing everything the hard way, making it into as elaborately difficult an operation as possible? [An interesting variant on such thinking is to be found in the approach of the noted Louisiana angler, B. Jarrett Mills, who expresses disdain for the use of all artificial flies, plugs, lures, or whatever in the taking of fish, and approves only of the use of organic bait (whether dead or alive), on the theory that to entice a fish of whatever kind with bait that if successfully removed from the hook cannot be eaten constitutes a betrayal of piscatorial ethics! The fish, Mills declares, has been made to risk its very existence without any hope of reward.]

In other words, though I willingly grant the trout fisherman his right to catch fish in any way he pleases, the whole procedure seems to come perilously close to fantasy. It is as if a man who claimed to be expert in the structural problems of architectural design were to spend his time exclusively at seeing how elaborate and lofty a tower he can build out of a deck of playing cards. Trout fishing, however it may deliberately be made difficult to do well, appears deficient in the sense of reality.

Now in point of fact there is no reason whatever why a bottom fisherman cannot enjoy much the same kind of satisfaction as the trout fisherman, if he wishes to handicap himself in similar fashion. There is nothing to prevent him from attaching a piece of 2-pound-test leader to his line, affixing a hook and bait to it, and lowering it to where the bottom-feeding fish lurk. Anyone who knows fish knows that pound for pound any salt-water fish is far stronger, far more disinclined to be hauled in on a line than a comparable fresh-water fish. Take a 10-foot length of monofilament; affix a trout to one end and a croaker or gray trout to the other; and see which one will pull the other along with it. The salt-water fish will haul the trout all over the river. Let a decent-minded bottom fish take hold of bait attached to a 5X leader, therefore, and the fight that ensues will demand far more skill, and last much longer, than what is possible with a fresh-water trout, no matter how adventurous.

Why, then, does the bottom fisherman not do so? Because he is interested in catching fish, not in playing games. He asks only that the fish put up a reasonable struggle, sufficient to test his control of rod and reel, before being brought alongside to be netted, and he is satisfied. So far as he is concerned, the proper uses of fishing finesse and angling intelligence do not lie in excessive contrivance. It is as if someone who was skilled in target shooting, say, were to insist that the only appropriate method of testing that skill was through hitting the bull's eye while wearing a blindfold and aiming from between one's legs. It is the difference between fantasy and reality.

Reality. That is what, in terms of the catching of fish, bottom fishing offers its devotees. There is enough genuine fishing involved, enough of the excitement that comes of actually hooking, playing, and catching a fish, to make it unnecessary to pursue difficulty for its own sake. The genuine bottom fisherman need not strive to will himself into a trance in order to derive sufficient physical and imaginative satisfaction from his fishing. There is no need to school himself to accept long, barren stretches that are not only without fish, but without even the possibility of fish, as cherished opportunities to commune with nature in precious flight from the daily getting, spending, and laying waste of powers.

If one is a bottom fisherman one goes fishing to catch fish, and if a reasonable knowledge of the ways of tide and wind is among the fisherman's intellectual equipment, there is always the likelihood of hooking a fish. And as for the joys of nature,

there is just as much nature available where he fishes as on the Devon, the Beaverkill, the Deschutes, the Vatnsdalsa, or the Campbell. High sky, distant sails, diving seabirds, the shapes of wave and current, a light wind, and curious sea creatures are available to him for whatever philosophical use he desires. But they are not consolatory resources to be drawn upon when the fish refuse to bite; they are not substitutes for catching fish, but very much an integral part of the actual fishing. The rhythms of bottom fishing are such that there is time both for the pleasures of contemplation and for those of hooking fish, without any need to seek to exalt either because of deficiencies in the other. Speaking for myself, as a bottom fisherman I have found it abundantly possible to enjoy the full consciousness of wind, water, and sun while waiting for a fish to bite, and in the knowledge and expectation that one *will* strike, soon. ⊠

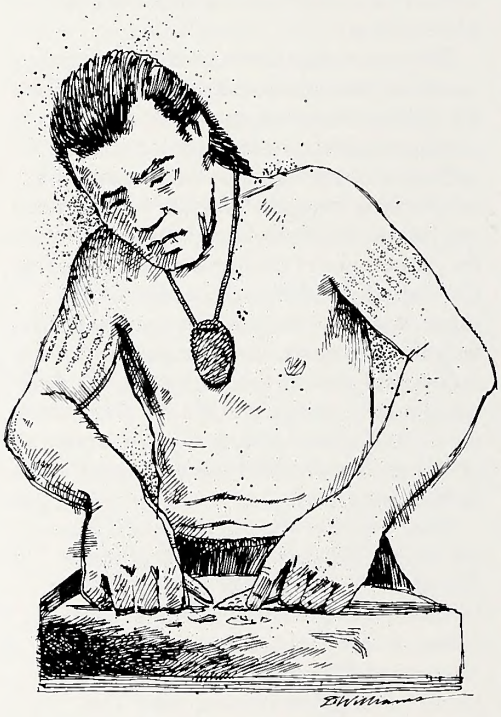
THE PEOPLE BEFORE US

The land we call home has been inhabited by humans for at least 12,000 years, and archaeologists have learned a lot about them from the many artifacts they left behind.

by Mark Taylor / photography by Ken Taylor

Walk almost any plowed field in North Carolina after a heavy rain and you're likely to find traces of a forgotten people. Twelve thousand years before the first Europeans stepped ashore in the New World, North Carolina was already inhabited by wandering bands of hunters. These small bands were gradually replaced by larger groups that moved with the seasons as they hunted, fished, and gathered nuts and food plants. Still later, Indian tribes planted large fields of corn, squash, and beans along our river bottoms, hunted and fished in the nearby forests, rivers and sounds, and in some cases built large mounds and temples within their walled villages to honor their gods.

What remains of their passing? Occasionally, a bulldozer will uncover a grave or village site, but far more common are the handfuls of broken pottery and stone projectile points that litter our fields. At first glance these artifacts tell us precious little about the peoples who made and used them, but collectively archaeologists have found they mirror changes in lifestyles and cultures in Indian societies.



ILLUSTRATIONS BY DAVID WILLIAMS

The earliest inhabitants of North Carolina were Paleo-Indians. The Paleo Period began at the close of the last Ice Age (approximately 10,000 BC), and continued until about 8,000 BC. The climate was colder then — much like Canada is today — and the land was covered with northern spruce-fir forests, large swamps, and grassy steppes.

"Paleo-Indians lived in small bands of perhaps 25 to 50 people, and subsisted by hunting big game, fishing, and gathering food plants," said Dr. Trawick Ward, staff archaeologist of the research laboratories of anthropology at the University of North Carolina in Chapel Hill. "Their primary prey was probably large, extinct Ice Age mammals, such as the elephant-like mastodon and mammoth, giant bison, camel and horse, along with moose, elk, deer and smaller game.

"Unfortunately, we find very little evidence of Paleo-Indians in North Carolina. Occasionally, someone picks up a Clovis or Hardaway projectile point in a field, but that's about it. Wooden, bone, or leather artifacts — which include tents, hide scrapers, bone needles, awls, fish hooks, and fish nets — have all disappeared."

The Clovis point is the classic Paleo-Indian spear point. These long, slender, beautifully worked spear points had a narrow channel or "flute," and were fastened to a short bone foreshaft with sinew or rawhide thongs. This foreshaft fit into a socketed spear, and the weapon was used to kill large Ice Age animals with repeated thrusts. Hunters carried extra foreshafts to use in the hunt and as knives to butcher their quarry. Although only a few Paleo-Indian kill sites have been unearthed, all in the Far West, Clovis points are found throughout the country and many scientists have noted that the extinction of the large Ice Age animals coincides with the rapid spread of Paleo-Indians across North America.

Only one large Paleo-Indian camp — the Hardaway site overlooking Badin Lake —has been found in North Carolina. Many other sites, however, may be underwater.

"Over the past 18,000 years the sea level has risen approximately 300 feet, and many Paleo-Indian sites are probably located on the edge of the Continental Shelf or along drowned river channels in our sounds and big coastal rivers," said Dr. David Phelps, an archaeologist at East Carolina University in Greenville. "What we now think of as the coast would have been far inland. These people probably would have preferred living in coastal areas because of the richer food resources. Although we think of the Paleo-Indians primarily as hunters, we're sure they also utilized fish, shellfish and plants."

As the Ice Age waned, the climate slowly warmed and the vegetation changed. Beginning about 8,000 BC, the spruce-fir forests and grassy steppes gave way to a mixed forest of white pine and hemlock, sugar maple, beech, and other northern

The atlatl *or spear thrower appears in the Archaic period, and atlatl weights or "bannerstones" are frequently found. The semi-lunar or Stanly weights (left) appear first, and the bar and winged stones slightly later.*

Some atlatl weights, projectile points, and stone tools were bound to shafts or handles with wet rawhide or deer sinew. The binding material shrank to a tight fit, and natural glues found in these substances provided additional strength.

Bone tools *found in a Late Woodland Siouan village reflect a variety of uses. These tools are seldom found at Archaic or Paleo sites, however, because of poor preservation. From left to right is a large awl made of deer bone, an antler projectile point, bone beads, fish hooks cut from deer bone, a tortoise shell scratcher or comb, and small awls and a needle.*

hardwoods. The mammoth, mastodon, giant bison, camel and horse had become extinct in North Carolina, and elk and deer were common. By approximately 6,000 BC the climate had warmed to the point that it was much like ours today, and the northern forests had been replaced by southern pines and hardwoods.

The warming climate also ushered in new ways of life for the native peoples of North Carolina, a change that marked the beginning of the Archaic Period. During this period (from 8,000-1,000 BC), people changed from nomadic hunters and gatherers to village dwellers.

"Life in the Early Archaic Period wasn't much different from Paleo times," said Ward. "The Indians were gradually developing a hunting, fishing, and gathering lifestyle which took advantage of specific resources during certain seasons. Deer had become the predominant game, and fish and shellfish became more important at inland sites. During the Middle and Late Archaic periods, the people are really adapting to forest life, and we find more wood-working tools. People were living in more permanent camps and used outlying camps for obtaining food."

The Archaic Period also saw pronounced changes in hunting techniques and projectile points. Javelin-like throwing spears replaced the earlier thrusting spears, and the finely worked Clovis and Hardaway points of the Paleo Period were abandoned in favor of a wide variety of side-notched and stem based points. Weapons improved with the introduction of the atlatl, or spear thrower, around 6,000 BC. This short stick had an antler hook on one end and a drilled, stone atlatl weight, or "bannerstone," in the center.

The notched spear lay within a groove in the atalatl, and the added leverage enabled hunters to make longer, more accurate and powerful throws at deer and other forest game.

Extensive stone working also took place during the Archaic Period. One of the best examples of this is the Doerschuk site, an archaeological site located on the Yadkin River approximately four miles downstream from the Hardaway site.

This site was primarily a stone-quarrying camp and tool-making center, and large numbers of unfinished blanks, partially finished points, and tools found there clearly illustrate the tool-making process. First, the stoneworker found a suitable outcrop of rock — usually slate, flint, or quartz, which fractures cleanly. Then, with a "hammerstone," a hard, round, fist-sized rock often obtained from riverbeds, he struck the "core stone," knocking off long, thin flakes called "quarry blades." These were either stored on the site — one cache on the nearby Uwharrie River contained 1,026 Savannah River quarry blades — or carried back to the camp for further work.

Later, the artisan struck each edge of the quarry blade with a smaller hammerstone until he produced a rough projectile point, blade or knife. At this point, he was often done. If the tool needed finer work, he used the tine of a deer antler to pressure-flake the edge to produce side notches or a sharp, symmetrical cutting edge.

Axes, atlatl weights and mortar and pestles required different techniques. A small river pebble or "pecking stone" served to chip the rough outline of the tool from a crystalline rock which would not fracture on impact, and rubbing the tool with a sandstone or quartz "abrading stone" produced a smooth surface. Holes were drilled last by spinning a hollow reed between the palms, and pouring abrasive, wet sand into the hole.

The mountains and the Carolina slate belt, which runs from Virginia through the center of the state, were the scene of extensive quarrying. This is missing, however, in the Coastal Plain.

"Quarrying or trading for stone from the Piedmont wasn't necessary because there were plenty of quartz outcrops along the Fall Line, and the bottoms of the Coastal Plain rivers were also covered with stone left as glacial outwash from the Ice Age," said Phelps. "Rocks from the river bottom were already small enough to carry back to the camps and work into finished points and tools."

Soapstone bowls first appear about 2,000 BC in the beginning of the Late Archaic Period. These bowls were carved with stone tools from outcrops of soapstone found along the edge of the Blue Ridge

Saving A Resource

Collecting Indian artifacts from old fields is a hobby enjoyed by many, and does no harm. Digging for artifacts, however, is not only illegal on government lands, but very destructive.

"An archaeological site has little value if the layers of soil or 'stratigraphy' have been altered," said Stephen Claggett, chief archaeologist for the N.C. Division of Archives and History. "In an archaeological dig, soil is painstakingly removed by layers and all of the artifacts and food remains are collected, identified, and catalogued. This dates the material, and gives us a good idea how these people lived. When pot hunters dig up a site and take only the best artifacts, these layers get mixed up and the site's value to archaeologists is largely lost.

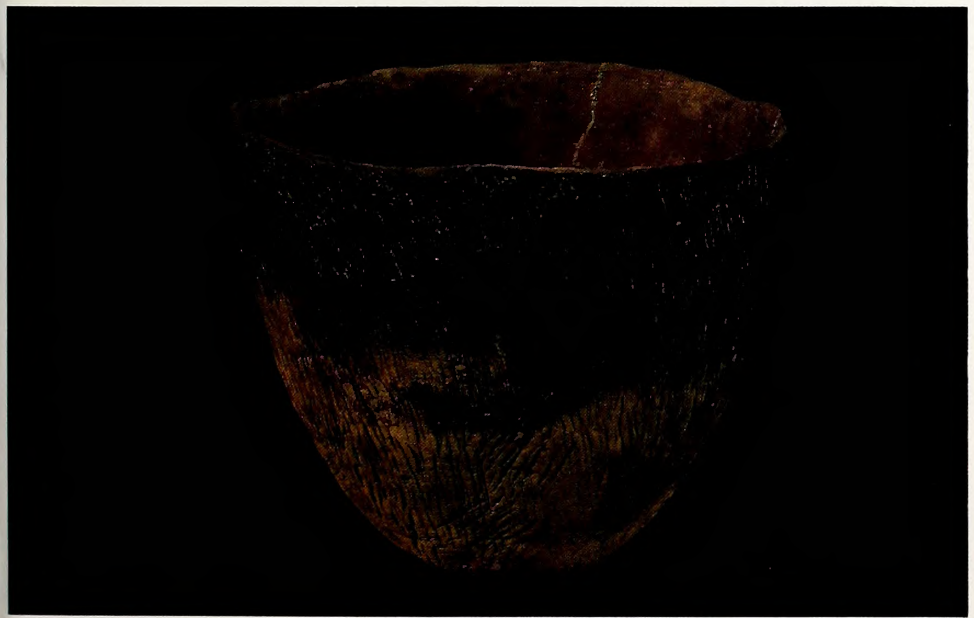
"Artifact collectors who find points and pottery on the surface, however, can help us by reporting their discoveries. We are not interested in obtaining the artifacts, but only want to know what they found and where. This will help show the distribution of different groups across the state, and may help pinpoint important sites. There are also many opportunities for volunteers to help at archaeological digs. The best way to do this is to join the Friends of North Carolina Archaeology."

Artifact reporting forms, and information on the Friends of North Carolina Archaeology, are available from the Archaeology Branch, N.C. Division of Archives and History, 109 E. Jones St., Raleigh, N.C. 27611.

Piedmont pottery *often displays northern and southern influences. This Pee Dee bowl (left) ca. 1550 from Town Creek was made by Muskogean people, and is decorated with a complicated-stamped pattern common to Mississippean societies of the Deep South. The Siouan bowls and turtleshell dipper were recovered from a Historic site dated to 1650-1660 AD in Stokes County. These plain-surfaced bowls are tempered with fine sand. The bowl in the background is of Cazuela form and has reed punctuations, which are common farther south.*

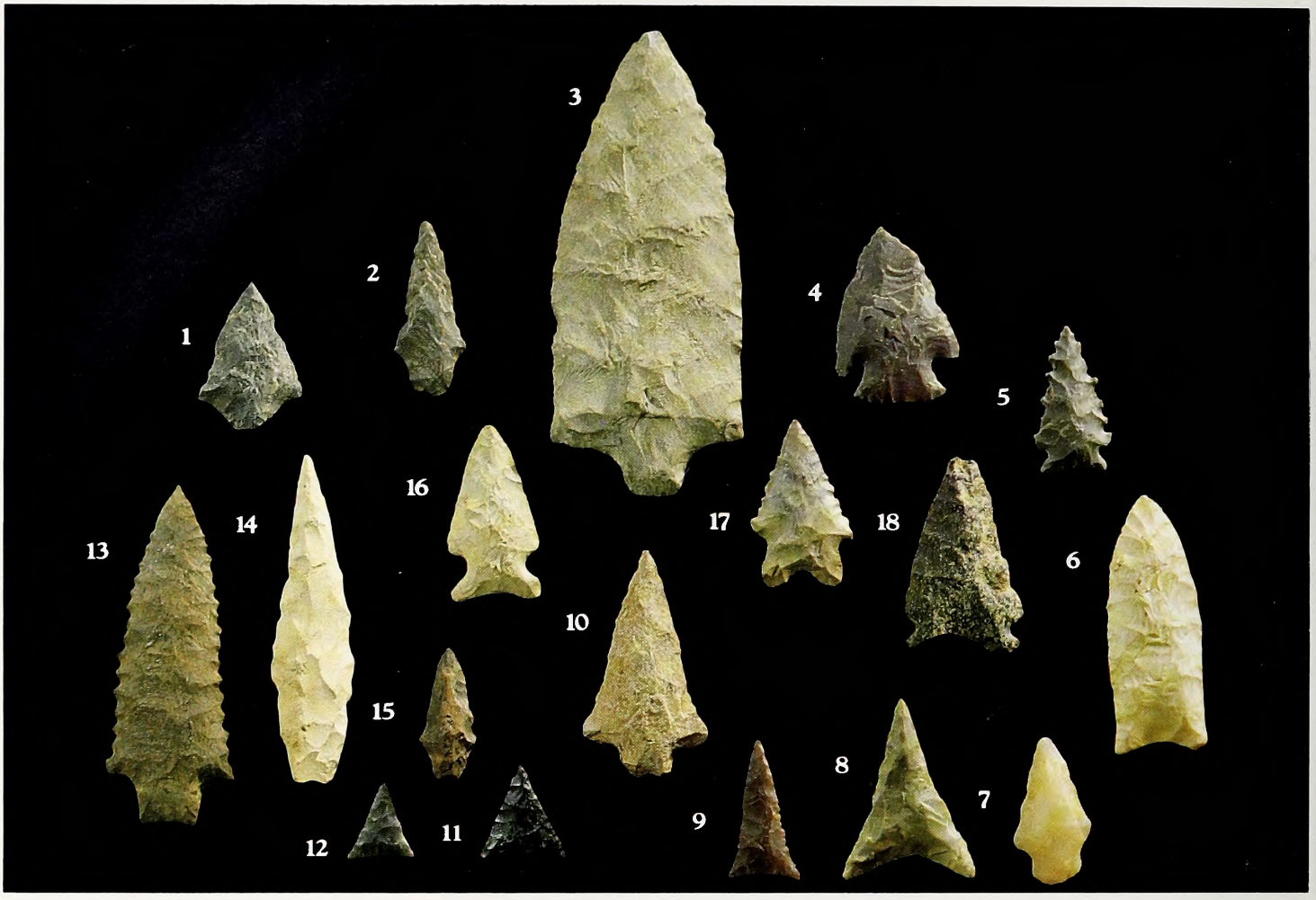
The Cherokee *were heavily influenced by complex, agricultural Mississippian Indian societies in the Deep South and Mississippi valley, and this is reflected in their pottery (a style known as complicated-stamped) and the building of temple mounds for ceremonial centers.*

Complicated-stamped pottery is produced by pressing a carved wooden paddle into the walls of the clay vessel before it is fired. Elaborate rims and incised lines are also common embellishments. On the left is a Pisgah pot (ca. 1300 AD), and two Qualla pots produced during the Historic Period (ca. 1700 AD).



The first pottery *found in North Carolina appears on the Coastal Plain. This sand-tempered, cord-marked vessel (ca. 1,000 BC to 300 BC) is a good example of the northern pottery which replaced earlier Savannah River, fiber-tempered pottery in the Coastal Plain. Later, coastal pottery was often tempered with oyster shell, also a northern characteristic.*

Pottery was first developed in the New World in Colombia, South America, and near the mouth of the Savannah River between 3,000 BC and 2,500 BC. Although the styles and tempering materials of this early pottery are very similar, most archaeologists believe that the technology was developed independently in both locations.



Native Cultures Of North Carolina

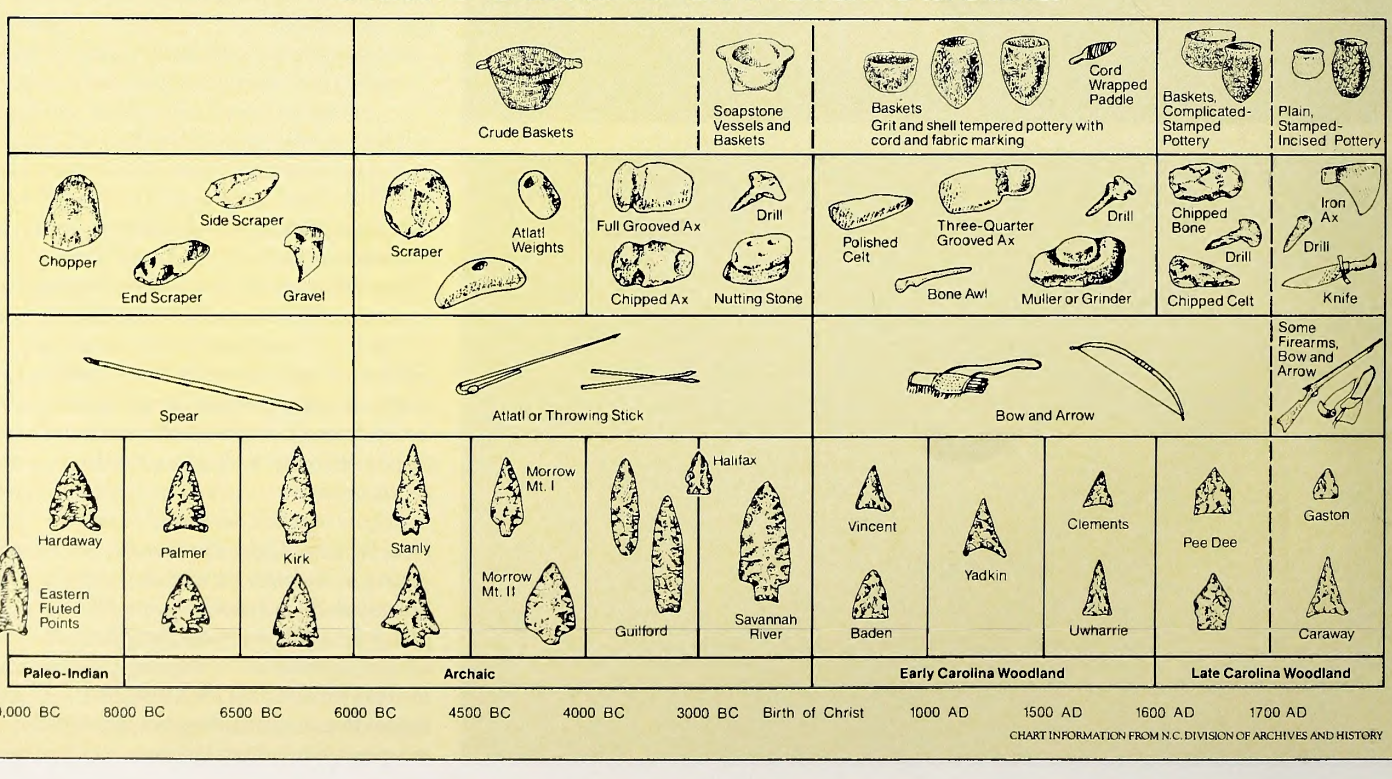


CHART INFORMATION FROM N.C. DIVISION OF ARCHIVES AND HISTORY

***Spear points** and arrowheads varied widely in style and size. From left to right are 1 and 2 — Morrow Mountain point types I and II (4,500 BC and 4,000 BC, Archaic), 3 — Savannah River (2,000 BC, Archaic), 4 — Kirk Corner-Notched (7,000 BC, Archaic), 5 — Palmer Corner-Notched (8,000 BC, Paleo), 6 — Clovis (10,000 BC, Paleo), 7 — Gypsy (800 BC, Woodland), 8 — Yadkin (500 BC, Woodland, 9 — Uwharrie (400 AD, Woodland), 10 — Stanly (5,500 BC, Archaic), 11 — Caraway (1200 AD, Woodland), 12 — Clarksville (1600 AD, Woodland), 13 — Kirk Serrated (7,000 BC, Archaic), 14 — Guilford (3,500 BC, Archaic), 15 — Randolph (1700 AD, Historic), 16 — Big Sandy (6,000 BC, Archaic), 17 — Lecroy (6,000 BC, Archaic), and 18 — Hardaway Side-Notched (10,000 BC, Paleo).*

Mountains and along the Fall Line, and were hollowed out using antler chisels and wooden mallets. The finished bowls were similar in size and shape to a cast-iron Dutch oven.

The Archaic Period gradually merged into the Woodland Period, which extended from roughly 1,000 BC until the beginnings of European contact in the 1500s. This was a period of great technological and social change. The bow and arrow and pottery replaced spears and soapstone bowls, and the old lifestyle of hunting, fishing and gathering waned in favor of agricultural societies supplemented by these activities. By 1,000 AD many Woodland peoples were living in permanent, palisaded villages and were growing crops of maize, squash and beans along the river bottoms. This more settled lifestyle led to the formation of tribes based on older linguistic affiliations. The Algonkians, a northern group extending up the coast to Canada, occupied the Coastal Plain south to the Neuse River. The inner Coastal Plain between the Roanoke and Neuse rivers was occupied by the Tuscarora, a northern group of Iroquoian stock. The southern Coastal Plain and Piedmont was occupied by many small Siouan groups, and the mountains by the Cherokee, also Iroquoian speakers.

Differences between tribes are best reflected in pottery because of its variety of vessel shapes and decorative finishes. The first pottery found in the New World was made in Columbia, South America, around 3,000 BC. This pottery had plant fibers mixed into the clay as a "tempering" material. About the same time (from 3,000 to 2,500 BC), pottery first appears in North America on the Southeast coast near the mouth of the Savannah River. This pottery is also tempered with plant fibers, often Spanish moss, and is very similar to the South American pottery.

Indian pottery was not made on a wheel in the manner of modern pottery. First, Indian men or women found a deposit of clay — usually on the edge of a stream. Then, they kneaded tempering materials — plant fibers, sand, gravel or shell — into the clay or "paste." This made the clay more compact, and produced a harder, more durable pot. The tempered clay was rolled between the hands into long, cylindrical coils, and these were built up and out until the pot reached the desired height and shape. Using their hands or a shell or stone tool, they thinned and smoothed the vessel walls. Then, wrapping cloth, cord or a fish net around a wooden paddle or dowel, they pressed it into the wet clay, transferring a pleasing design to the outside of the vessel. (This was not done on early fiber-tempered vessels, however. The ends of the clay-embedded fibers burned when these pots were fired, producing a pleasing pattern of tiny holes.)

After the "green" pots had air-dried, large numbers were placed in a pit for firing. A fire slowly burned below and above them for many hours until the clay oxidized and hardened. This process remained unchanged, and the Pamunkey Indians of coastal Virginia produced traditional pottery as late as the 1930s.

Pottery spread slowly from the Savannah River area, and fiber-tempered pottery reached the southeastern Coastal Plain of North Carolina around 1,000 BC.

Shortly after 1,000 BC, sand-tempered pottery from the mid-Atlantic region replaced fiber-tempered ceramics in the southern Coastal Plain.

Pottery came later to the Piedmont and Mountains. The first pottery found at the Doerschuk site appears around 800 BC. These vessels were fine, hard pots tempered with very fine sand. Excavation of the Gaston site in Halifax County, which was done by Dr. Joffre Coe of the University of North Carolina in 1955 prior to the impoundment of Roanoke Rapids Lake, shows that similar pottery was introduced to the northern Piedmont at about the same time. Coe had also excavated the Doerschuk and Hardaway sites in the late 1940s.

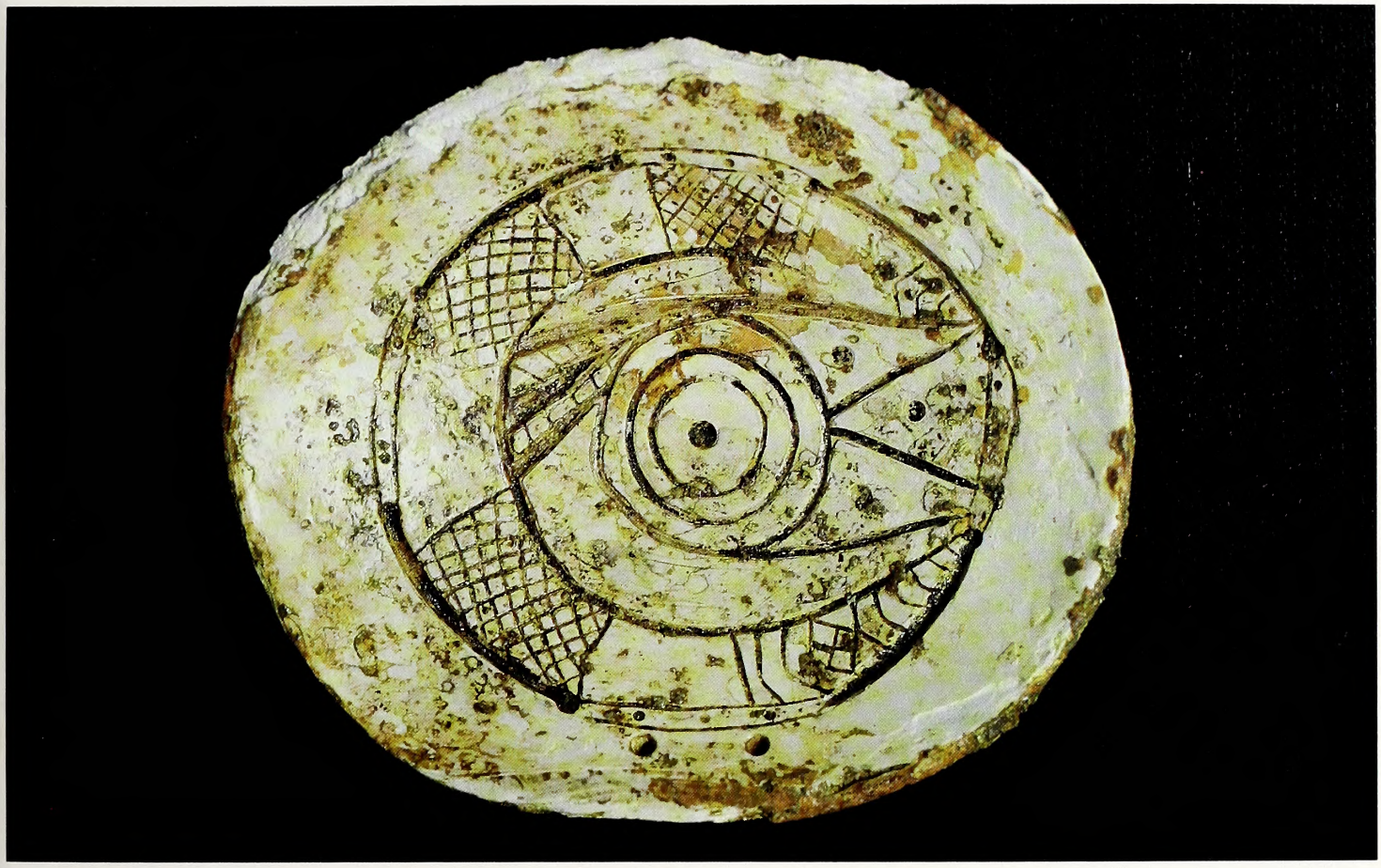
"The styles and tempering materials of these early ceramics all show that North Carolina Indians had closer ties to the North than to the South," said Phelps. "Northern pottery usually had a cord or fabric-marked finish, and was tempered with sand, shell, or, in early times, soapstone."

The exception to this was the Cherokee pottery of the mountains. The Cherokees were more closely affiliated with the powerful tribes of the Mississippi and Ohio river valleys. The earliest Cherokee pottery appears between 600 and 700 BC. This and later Cherokee pottery is produced by pressing an intricately-carved wooden paddle into the wet clay, incising lines into the clay with a pointed tool, and adding elaborate rims to the vessels. This "complicated stamped" pottery had replaced early

***Many types** of stone tools are found from the Archaic and Woodland periods. At the top left is a hoe, and to the right is an adz, "nutting stone" for shelling nuts and a hammerstone for making tools. At the bottom left is a grinding stone, and to the right is a celt or small ax.*

These tools were produced by chipping out their rough shape with a small "pecking stone," and rubbing their surface smooth with an abrading stone. Most tools could be made in a day or less. In contrast, projectile points could often be made in a few minutes.

***Necklaces and other** ornaments found in a historic Cherokee burial in Clay County are a mix of European goods and native materials, often traded from the coast. On the outside are rolled copper trade beads strung on original cordage, which was preserved by salts from the copper beads. On the left are white glass trade beads. Inside, from the top down, are an Olivella shell bead, a shell bead flanked by glass trade beads, and a small copper effigy. Small, blue "seed beads" were a popular European trade item, and inside these are a brass button and shell pendant. Above these and the rolled copper trade beads is a Columella shell bead made from a whelk.*



A shell rattlesnake *gorget is one of the hallmarks of the Mississippian societies in the Deep South, and its symbolism probably originated in the Indian civilizations of Mexico and Central America. These gorgets are occasionally found in the Piedmont and Mountains, and usually date to about to AD 1,000-1,200. This gorget was found in a Piedmont Siouan village dating to the late 1500s or early 1600s, and may have been an heirloom that was passed down through the generations.*

fiber-tempered ceramics in much of the Deep South.

The bow and arrow appeared about the time that pottery was introduced. This development was accompanied by a new series of points, some no larger than a thumbnail. Some of the Woodland arrowheads are finely worked, but others are very crude and barely symmetrical.

"In general, the workmanship in projectile points declines steadily from the Paleo Period through the Woodland Period," said Ward. "However, this may just mean that craftsmanship was going into other areas. Although leather, bone or wood artifacts from the Paleo Period haven't been found because of poor preservation, it's possible that one of the few ways a Paleo-hunter could express himself artistically was through the crafting of beautiful points. In the late Archaic and Woodland periods, however, people were making beautiful wood and bone tools, decorative items such as gorgets and shell and bead necklaces, fine pottery, pipes, and many other items."

By the end of the Woodland Period, most of the suitable river bottoms were being farmed and villages generally lay a day's travel apart. By the early to mid-1600s, however, the number of sites declines dramatically.

"Diseases such as smallpox, measles, flu and even the common cold took a heavy toll before European settlement even began," said Ward. "This ushers in the Historic Period, which extends from the mid-1500s through the colonial era. Even though the Indians of this period were under considerable stress, they did not abandon their traditional ways of life. They continued to make pottery and produce points while using iron cookware and firearms. In fact, some of the finest Indian pottery was produced during the 1700s."

Ward and other archaeologists found this to be the case when they excavated Occaneechi, a Siouan village on the Eno River visited by John Lawson in 1701. Although gun flints were numerous, they also found many small, crude "bird points" and other arrowheads.

"Some of these points were worked from older points, and could probably be knocked out literally in a matter of seconds," said Ward. "They may have been used when powder and shot wasn't available."

Labeling these points as bird points is misleading, for they were used for big and small game. Also, the crudity of the points belies their effectiveness. Consider this account by the 19th-century North Carolina historian Fran Kron, who met a band of Siouan Indians along the Yadkin River.

"As late as 1824... bands of 10 or more (Indians) were frequently met with on their way to Fayetteville, armed with bows and arrows, and ready for a reward to display their dexterity in hitting, before it came down, a piece of coin tossed up in the air."

It's hard to walk North Carolina today and picture an Indian hitting a coin with an arrow or throwing a spear at an elk. Perhaps that's why people feel a certain magic when they find an arrowhead or shard of pottery in an old field. These pieces of broken clay and shattered stone provide a direct link to forgotten peoples whose hopes, fears, and dreams were probably little different from our own. ⊠

Leave Beer At Home

Holiday Boating Calls For Extra Caution

Written and Edited by Mark Taylor

The weekend of July 4 is considered the busiest boating weekend of the season in North Carolina. Officials with the Wildlife Commission offer these tips to help avoid any boating accidents during the holiday.

"If we could tell people only one thing, it would be to leave alcoholic beverages at home when they go boating," said Colonel Harold Ragland, chief of the Wildlife Commission's Division of Enforcement. "Studies nationally and in North Carolina show that a high percentage of the operators and victims in fatal boating accidents would be considered legally drunk if they had been operating an automobile. Even small amounts of alcohol can slow a boater's reflexes and reduce alertness, especially after spending a day in the sun and wind. Bring plenty of soft drinks or other beverages to prevent dehydration in the hot sun, but leave the beer at home."

REX GARY SCHMIDT

A Sign Of Summer: *Boating is a great way to enjoy the outdoors, and safety is important. Lone boaters or fishermen, children, and nonswimmers should always wear personal flotation devices.*

Ragland adds that families with small children need to be especially careful. "All children and non-swimmers should wear Coast Guard approved personal flotation devices (PFDs) at all times. Also, be sure that children are under control and seated when the boat is under way. We occasionally see parents who let their children roam about or even sit on the tip of the bow when the boat is moving. This is extremely dangerous. It's easy to fall overboard or be thrown from a boat."

The number of boats on the water also calls for extra care and courtesy. "Be sure you're familiar with the rules of the road, and exercise them," said Ragland. "Also, be courteous. Slow down for other boats, and give sailboats, fishermen and water skiers plenty of room. It's also a good idea not to spend too much time on the water. It's surprising how tired you can be from a day's boating, and fatigue plays a big role in boating accidents. Taking a break, and getting off the water for a few hours' rest during the hottest, brightest part of the day can be a big help."

Ragland adds that reckless and drunken boating is a crime. These incidents can be confidentially reported (get the boat registration number if possible) to the Wildlife Commission's 24-hour, toll-free Wildlife Watch Hotline at 1-800-662-7137.

Reader Spent 43 Years Boatbuilding

Carolina Boat Company Stirs Memories

Dear *Wildlife:*

I enjoyed the article and photographs of the Carolina Boat Company in the April issue of *Wildlife In North Carolina* magazine. It sure brought back memories of the days when I worked on this same type of boat. I was employed by the old Lumberton Boat Company from 1953-54. This company was started by a Mr. Crowson Edwards, and was an offshoot I believe of the old Carolina Boat Company. The Lumberton Boat Company has been defunct now for many years.

The James Hunt shown in the photos in your article was my co-worker during these years. At this time, both companies built boats along the same lines. Both were well-constructed and built for the fisherman who wanted a good boat at a very economical price.

After many years in the boat building trade with various companies, having worked on boats from the one-man type shown in the article to 45-footers, I am now retired.

This article brought back fond memories of days gone by. Thanks for an article well done, and I hope you will come up with more stories about fishing boats in the future.

—*Bob Kemp*
Archdale

Wins Field Trial

Big Jake Top Dog

JANE ROHLING

Top Dog: *"Bisco Big Jake," trained by Pete Hicks of Bisco Kennels in Bisco, North Carolina, captured top honors at the North Carolina Quail Championships held this spring at the J. Robert Gordon Field Trial area.*

Spectacular Waterfalls Along Route

Foothills Trail Offers Solitude To Hikers

EVELYN ANGELETTI

A Good Day's Work: *Volunteers help maintain the Foothills Hiking Trail, which crosses the Horsepasture, Thompson, Toxaway and Whitewater rivers.*

Where can hikers find solitude and a pristine setting? One of North and South Carolina's less well-known hiking areas is the Foothills Trail, a 100-mile trail which links Oconee and Table Rock state parks.

Some of the best hiking and most beautiful scenery, however, is found in the 43-mile stretch of trail maintained by Duke Power Company. This portion of the trail winds behind Lake Jocassee, and crosses the Horsepasture, Thompson, Toxaway, and Whitewater rivers before ending at the parking area of upper Whitewater Falls. The trail was built by the company in 1983 as part of the mitigation agreement for the licensing of their Bad Creek pump-storage hydroelectric facility, and workers constructed 24 footbridges, including a 220-foot span over the Toxaway River, and numerous steps and handrails on steep portions of the trail.

"The entire trail was built to Appalachian Trail Conference standards, which are very strict," said Charles Borawa, supervisor of Duke's project recreation department. "The trail corridor averages 4 feet in width with an 18-inch treadway and a maximum grade of 10 percent. We also have a full-time worker, Benji Cannon, who maintains the trail. This was our first attempt at any kind of trail project, and it has been very well received. It really does pass through some beautiful country."

The management of the entire trail, however, is coordinated by the Foothills Trail Conference. This group formed in 1974 to promote the construction of the trail.

"The trail is divided into 13 sections, and different groups have adopted sections of the trail," said Evelyn Angeletti of the conference. "Groups visit their sections in the spring and fall and clear out blowdowns, repair erosion damage, and clean up litter. When they encounter major damage, it is reported to the conference and a work crew is assigned to take care of the problem."

The conference notes that hikers can eliminate many problems by taking several simple steps. These are to stay on the trail (cutting across switchbacks leads to erosion and gullying), carrying out all litter including that left by other parties, walking on the inside of the trail where it has been cut into the hillside, removing small, natural debris from the trail, and refraining from cutting or breaking too much brush.

Single maps of the Duke Power portion of the trail are available free from Lucinda Trew, Media Services, Duke Power Company, P.O. Box 33189, Charlotte, N.C. 28242. A guide to the entire trail is published by the Foothills Trail Conference, P.O. Box 3041, Greenville, S.C. 29602.

Held By Three Generations

Lifetime Licenses Become Tradition

Supporting the Wildlife Endowment Fund has become a family tradition for the Phillips family of Conover. Three generations of the family hold lifetime sportsman's licenses. Funds from the sale of lifetime hunting and fishing licenses support a wide range of conservation projects.

The first to buy a lifetime sportsman's license was 50-year-old Fred H. Phillips Sr., who purchased it on February 18, 1983.

"I've always been a hunter and fisherman," he recalled. "And on Christmas Day of 1986, I presented my 24-year-old son, Fred H. II, with a lifetime license. He also enjoys hunting, fishing, and training bird dogs."

The latest addition to the Phillips family, Fred H. III, also was soon taken into the fold. He received his lifetime sportsman's license from his grandfather when he was four months old.

"I hope he enjoys this license when he grows up," said the elder Phillips. "I've also given lifetime sportsman's licenses to my two other grandsons. We all enjoy the outdoors, and this is one way to preserve this heritage for the future."

Will The Real Shrimp Stand?

What's a trip to the beach without seafood, especially shrimp? Unthinkable, right? Feeding the family a full meal of shrimp might require a second mortgage on your home. Still these crustaceans can make dandy appetizers. Here are two shrimp recipes. One is for the real thing, and the other is for "landlocked shrimp" that can be found in the nearest farm pond. These were furnished by Ed Jenkins and Ray Johnson of the Wildlife Commission's Division of Enforcement.

Charcoal Shrimp

as many large or jumbo shrimp as you can afford
bacon

Cut bacon into 1½-inch pieces. Peel shrimp and saddle each shrimp with one piece of bacon, and secure with a toothpick. Place shrimp over hot coals on a covered grill. Cook about three minutes on one side and then flip over and cook two minutes more. Remove from grill and use the toothpicks to hold the shrimp while dipping in favorite cocktail sauce.

— *Ed Jenkins*

Panfish-Shrimp Appetizers

several ¼- to ½-pound panfish
salt
sugar
water

This recipe doesn't use shrimp, but it's almost as good as the real thing. Cut filets from fish, skin the filets, and cut the filets length-wise (each fish will yield about four pieces). Bring water to a boil in large pot adding 1 tablespoon of salt and 1 tablespoon of sugar for every quart of water. Drop fish pieces into boiling water and boil for 3-4 minutes (do not overcook). Drain fish and chill. Serve with favorite cocktail sauce.

— *Ray Johnson*

Restoration Projects Will Continue

Mike Seamster Named New Wild Turkey Project Leader

Mike Seamster of Yanceyville, a wildlife forester in District 5 which encompasses the central Piedmont, was recently named wild turkey project leader for the Commission's Division of Wildlife Management. He replaces Brian Hyder, who became southeastern field director for the National Wild Turkey Federation.

"We're confident that Mike will do an excellent job in his new position," said Grady Barnes, section manager for research and regulations in the Division of Wildlife Management. "He has plenty of experience in both wildlife management and forestry, and has been involved in the wild turkey project for many years."

Seamster earned dual degrees in forestry and wildlife biology from N.C. State University in 1973, and began working for the Commission as a wildlife forester that summer. Since that time, he also has served as the district wildlife biologist in Wildlife District 5. He has worked closely with Wayne Bailey, the Commission's former wild turkey biologist, and been in charge of the turkey trapping program on the Caswell Game Land since 1980. Birds are live-trapped from game lands and used to establish new flocks in other restoration areas.

"There are two wild turkey studies currently underway," said Seamster. "One is a study being conducted by David Cobb of N.C. State University on the effects of flooding on nesting of wild turkeys along the Roanoke River. The other is being conducted by Clemson University at the Coweeta Laboratories in western North Carolina, and involves research on evaluating brood habitat for wild turkeys in the southern Appalachians.

"The major thrust of the wild turkey project will continue to be restoration, however. Currently, we estimate that there are about two million acres of potential unoccupied wild turkey habitat in North Carolina. Most of this is in the mountains, but a significant amount is in the Piedmont and Coastal Plain. We plan to continue restoring populations of wild turkeys in all of these regions."

Hefty Fine Levied

Bear Claw Jewelry A Bad Investment

Wildlife enforcement officers in Buncombe County recently closed the books on a case that began with an anonymous phone tip. Keith Templeton, an enforcement officer stationed near Asheville, was told that a local jewelry store was selling jewelry fashioned with bear claws. Commercial trade in wildlife, or any part of wildlife, is illegal. Templeton notified another wildlife officer, Sergeant Steve Morrison, and the two men designed a plan to net the criminals.

JAY DAVIES

Hard On The Bear: *This string tie featuring a bear claw set in silver is one of 11 pieces of bear-claw jewelry recently confiscated in Buncombe County.*

Templeton entered the store in plain clothes a few days later, and looked at the jewelry. "They weren't making any pretense about not having the stuff," he recalled. "There were several silver bracelets, western string ties, watch bands, and pendants on display, all sporting bear claws."

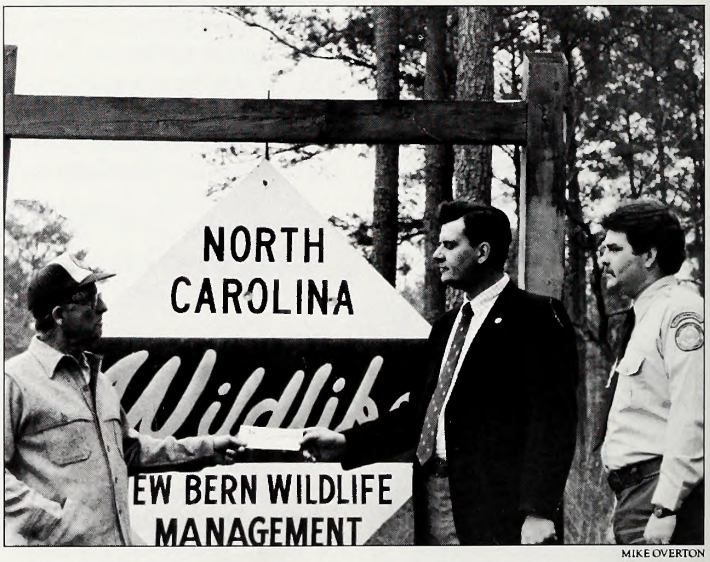
"We're selling you the jewelry and giving you the claw," said the store clerk, when Templeton inquired about the legality of the pieces.

That explanation didn't wash with the judge, however. He fined the men $250, and turned the confiscated jewelry — 11 pieces with an estimated retail value of over $800 —over to the Wildlife Commission for disposal.

— Jay Davies

Helps Publish Brochure

Quail Unlimited Boosts Small Game



MIKE OVERTON

A Helping Hand: *The Coastal Plains Chapter of Quail Unlimited in Jacksonville recently presented the Wildlife Commission with a contribution of $408 to help publish a booklet on small-game management entitled* Tar Heel Wildlife On The Farm. *Accepting the check is District 2 Wildlife Commissioner Woodrow Price of Gloucester (left), Jerry Schronce, chairman of the Coastal Plains Chapter of Quail Unlimited, and District 2 Wildlife Biologist Perry Sumner.*

Single copies of Tar Heel Wildlife On The Farm *are available from the Division of Wildlife Management, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.*

Notes Differences In Wildlife

German Game Warden Enjoys Tar Heel Holiday

What does a German forest inspector do for entertainment during a three-week visit to relatives in North Carolina? One man decided to learn more about wildlife management and law enforcement in the United States.

Bernhard Lippert is in charge of the 2,500-acre Peterstal Forest near Heidelburg, West Germany. His sister-in-law lives in Thomasville, and during a visit to North Carolina last Christmas Lippert spent several days with veteran wildlife enforcement officer Sgt. Bill Hedrick of Lexington. A friend had asked Hedrick to show the visitor around, and the goodwill gesture soon turned into a warm friendship.

Lippert started by purchasing a nonresident hunting license, and accompanied Hedrick deer hunting on his days off. He killed a doe during an either-sex hunt in Brunswick County. He also observed how Hedrick worked his normal wildlife patrols in addition to observing a night-deer hunting detail using Wildlife Commission aircraft.

Both men found there are vast differences between wildlife programs in the United States and Europe.

"We have over 60 million people living in an area only slightly larger than North and South Carolina," said Lippert, referring to West Germany. "This means that open land and forests where wildlife can live are in short supply. The climate is also much colder than in North Carolina, and it's much harder on the animals.

"The management of both forests and wildlife is much more intensive. I'm responsible for all of the management on our 2,500-acre government-owned forest. We use a 150-year harvest rotation for timber, and every tree is inspected once every 15 years during the course of that rotation. We literally keep track of every tree in the forest. We have to manage our forests more intensively because of the shortage of land.

"Hunting is also much different in West Germany. Less than one percent of the Germans hunt because it's difficult to get a license and find a place to hunt. A license may be obtained only after taking an in-depth, 150-hour hunter-safety course and passing a very difficult exam. Hunting is strictly controlled on government lands, and most private land is leased."

Hunters in Germany find no shortage of game, however. There are two species of deer alone. Most hunters seek the roe deer, which is a small animal that weighs about 50 pounds when full grown. Red deer aren't as common as roe deer but are eagerly sought, and may weigh up to 300 pounds. European wild boar, rabbits, hares, grouse, red squirrels and foxes are also popular game.

Lippert says that when a hunter in Germany kills a deer he is entitled to only the head, hide, liver and loin. "If he wants any more of the meat, he must buy it from the landowner. If the animal is taken on government land, the money from the sale is put back into the forest operations fund."

Lippert enjoyed his visit to North Carolina, and hopes that Hedrick will come over to Germany. "I want Bill to see how we do our wildlife work there, and have a chance to hunt with me," he said. "I really enjoyed my trip to North Carolina."

— *Terry Shankle*

Fire Brings Surprise Visit

Life is full of surprises. That's what John Parker of Raleigh learned when he decided to build a fire and reminisce about duck hunting one day last winter shortly after the season closed. Parker is an avid waterfowl hunter, and reviews coastal development permits for the N.C. Office of Coastal Management.

"It was a very cold night, and I had decided to build a fire in the fireplace, relax, and think about duck hunting," he recalled. "Well, I got the fire started but the chimney wasn't drawing well. I shone a flashlight up the chimney and saw that something was blocking it. I shook the damper and a webbed foot fell down into the fireplace. I shook it a little more and a duck head appeared and stared at me."

Parker removed the bird from the chimney, and found it was a domestic, white Muscovy duck that lived on a nearby pond.

"I carried it out the front door, and the duck took off like a rocket," he said. "It had been stuck in the chimney for about two days, but was in good shape. That's about as close as I got to a duck all season."

The Wildlife Endowment Fund Report

The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife In North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Status on April 30, 1987

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	27,602	$8,175,819.81
Lifetime Hunting License	169	34,611.37
Lifetime Fishing License	1,745	314,189.68
Lifetime Subscriptions to Wildlife in N.C.	1,021	126,180.32
Contributions	—	86,568.73
Fund Total		$8,737,390.91
Total Interest Earned	$1,713,106.44	

Calendar Of Events

July 4-5
Festival for the Eno in Durham. Music, crafts, and other events.

July 15-19
40th Annual Guild Fair of the Southern Highland Handicraft Guild at the Civic Center in Asheville. Features traditional and contemporary crafts, special exhibits, and mountain music.

July 17-26
U.S. Olympic Festival '87 in Raleigh, Durham and Chapel Hill. Shooting, canoeing and kayaking, and rowing are among the 34 featured events. For information write N.C. Amateur Sports, P.O. Box 12727, Research Triangle Park, N.C. 27709.

July 26
Curing Barn Party at the Duke Homestead State Historic Site in Durham. Traditional methods of curing tobacco featured.

July 31-Aug. 2
First Annual Carolina Huntin' Show at the Charlotte Merchandise Mar tin Charlotte. Features trophy deer head competitions, seminars, and exhibits of hunting equipment and outfitters.

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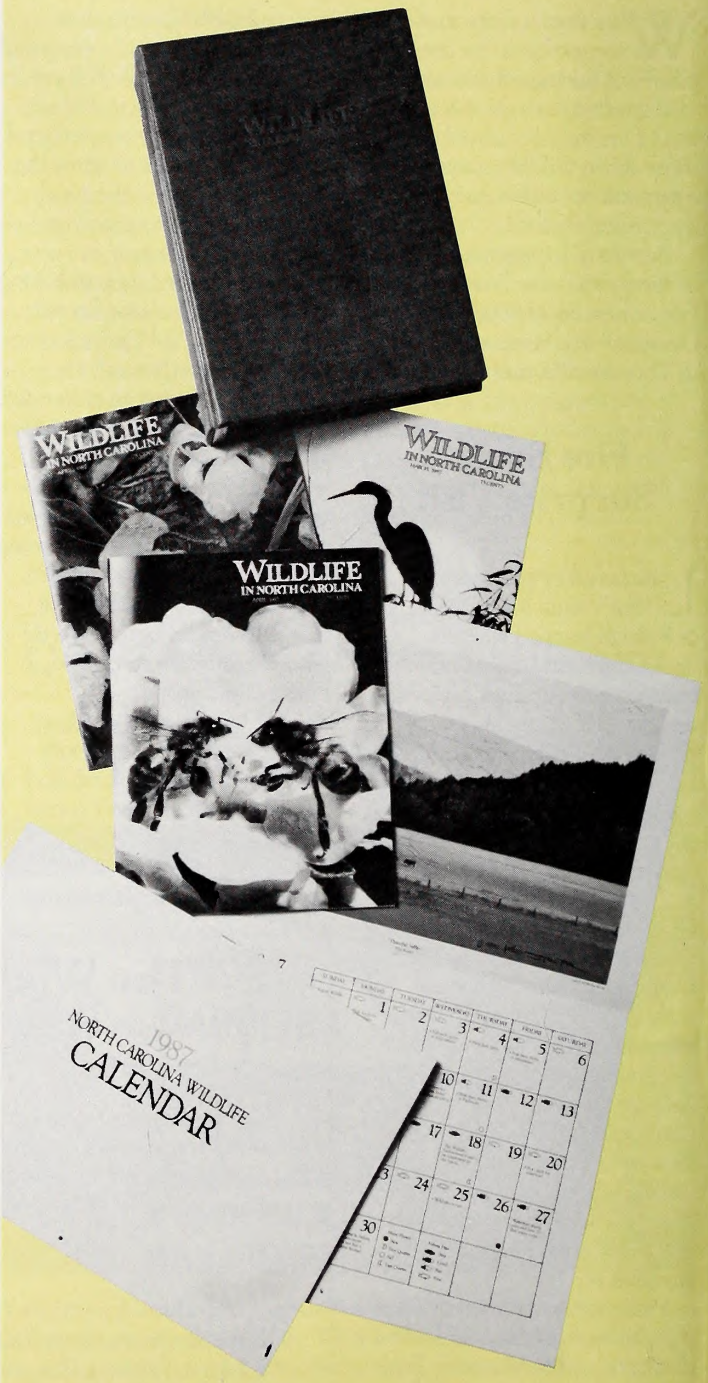

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Anatomy Of A Trifler

by Jim Dean

Fishing, and especially fishing for pleasure, has long been considered a trifling pursuit. It is no coincidence that the word "fisherman" follows the phrase "good for nothing" almost as frequently as eggs follow ham.

The late Reverend George Washington Bethune was well acquainted with angling's dubious reputation. In the mid-1800s, he was one of this nation's most prominent clergymen, and a noted writer and publisher. He was also an avid angler, an affliction he took no small pains to hide.

KEN TAYLOR

Fishing was considered even more trifling 140 years ago than it is today, and Bethune hid his tackle enroute to and from his favorite fishing holes so that his congregation would not suspect his true purpose. Furthermore, when he penned the scholarly preface to the first American edition of Izaak Walton's *The Compleat Angler* in 1847, Bethune signed it only as "The American Editor." Never mind that the relationship between fishing and preaching has a long, honorable history going back at least to Saint Peter. Bethune was taking no chances that his flock would learn of his secret passion. (One is tempted to add that his was a level of discretion much to be admired in light of recent events.)

If Bethune's followers believed fishing was a waste of time, imagine what they might have thought about someone who simply sat and watched someone else fish? "Too lazy to fish" may well be the ultimate insult, yet I have known many people who, as they grew older, preferred to watch others fish. It isn't a matter of laziness, either.

I think back nearly 40 years to afternoons on an old millpond in Halifax County. I can still visualize my grandfather sitting in the rear of the boat puffing on a Muriel Senator and spilling the ashes on his coat and tie. Grandpa would make a few casts from time to time, but he spent far more time paddling and watching me fish. If we approached a particularly good spot to catch a largemouth bass, he'd point it out to me.

"A good one hangs around that old stump," he'd say. "I'll hold the boat here while you try for him."

"But you always give me the good spots," I'd protest weakly.

"I'd rather see you catch him," he'd say.

If I felt a bit guilty, it was only because we both knew that I would rather see me catch him, too. That's hardly unusual at the age of 10, even if I couldn't understand my grandfather's motives, or those of my father. Dad routinely made the same sacrifices for my brothers and me, giving us the best seats in the duck blind, or making certain we had the best and safest shooting angles on the covey rise when Buck's nose was full of Eau d'Bobwhite.

At the time, it seemed to be an act of immense unselfishness, but I know better now. Indeed, it may be as much fun to pass along an obsession as it ever was to acquire it.

Watching a child catch a fish is one of life's great pleasures, and there is scant difference between that first tiny bluegill caught with the help of a grandfather, and the one you help your grandchild catch. The only difference I can detect so far is that such experiences seem to get better and better as the years pass.

This past summer, I watched as my daughter successfully stalked and landed her first big cutthroat on a tiny fly in Idaho. A few days later, she landed a big rainbow on a Madison River float in Montana. Would it have pleased me as much to catch those fish myself? Not quite. Likewise, I have been on hand when my son landed his first Spanish mackerel on the end of an Outer Banks pier, and again when he hooked his first big bass on a topwater plug in a Piedmont farm pond. Would I have swapped places with him? Well, I suppose in all honesty, it would depend upon just how big that bass happened to be.

There have been many such "sharings," and I hope there will be more. And if fishing or watching others fish is trifling, then I have not only wasted a significant part of my life, but helped a passel of blood relatives and good friends waste theirs. I'm no less guilty — and certainly no more repentant — than the late Rev. Bethune.

And for those who consider life so all-fired serious, consider the words of Judge John Voelker, known also by his pen-name, Robert Traver. He wrote the 1950s best-seller, *Anatomy Of A Murder*, but his most enduring prose appeared in a more obscure essay, "Anatomy Of A Fisherman."

"I fish," wrote Voelker, "...not because I regard fishing as being so terribly important, but because I suspect that so many of the other concerns of men are equally unimportant — and not nearly so much fun."

August, 1987
Volume 51, Number 8

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Cover *The grebe is a common seasonal inhabitant of North Carolina's wetlands, and is frequently mistaken for a small duck. When startled, this small migratory bird invariably dives instead of flying. Photograph by William Lea.*

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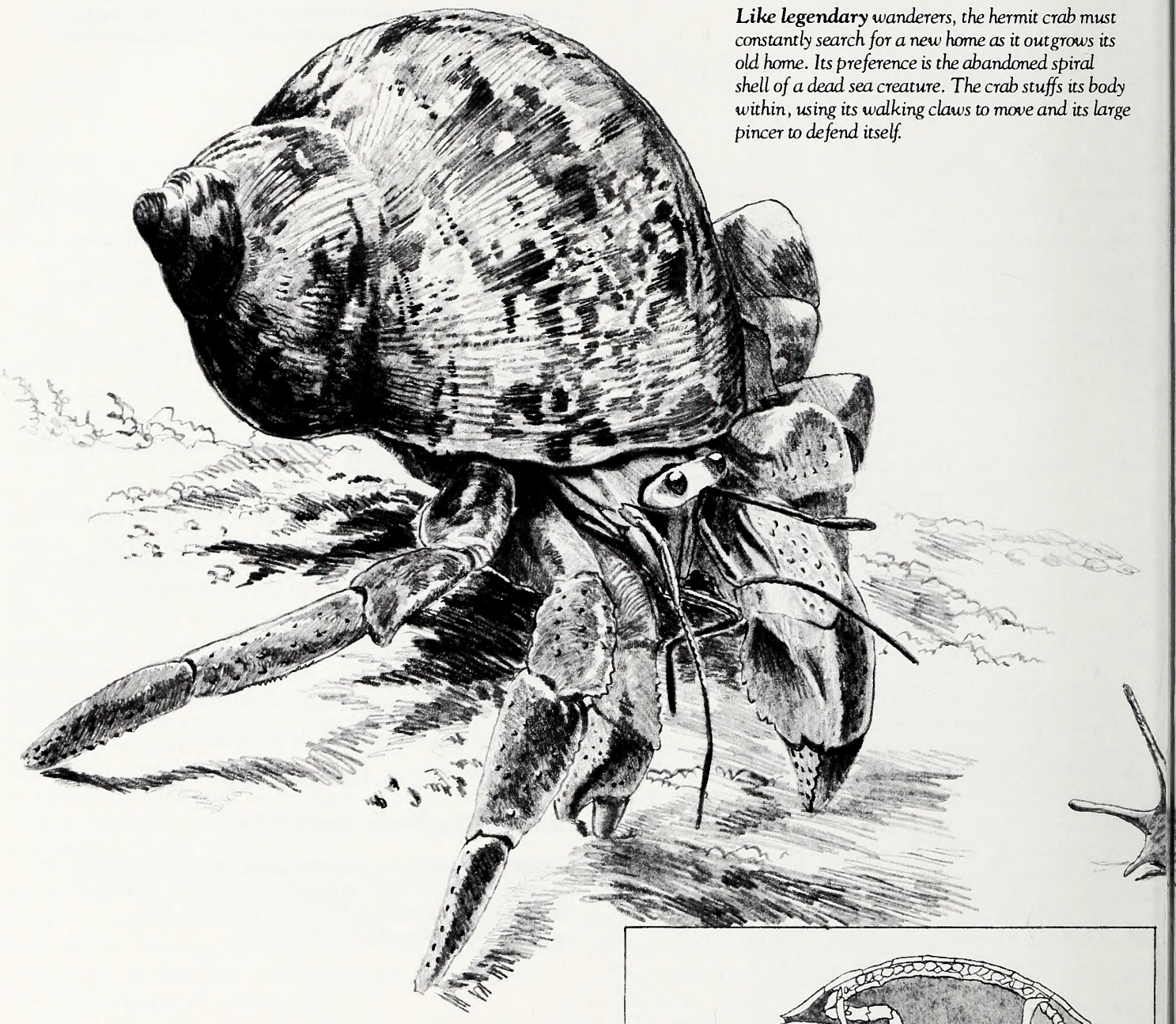
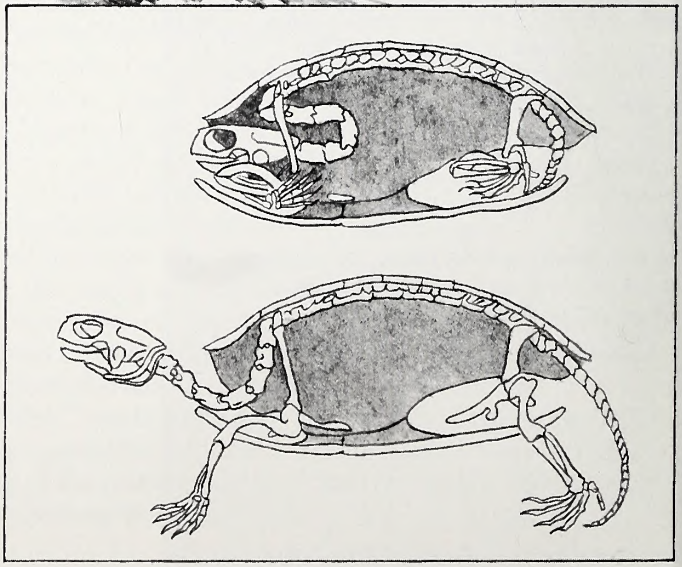
Like legendary *wanderers, the hermit crab must constantly search for a new home as it outgrows its old home. Its preference is the abandoned spiral shell of a dead sea creature. The crab stuffs its body within, using its walking claws to move and its large pincer to defend itself.*



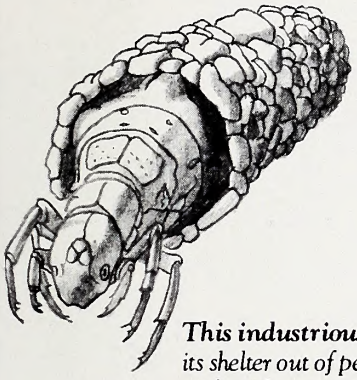


The hard, bony *shell of the turtle shelters its vulnerable parts like an impregnable castle. The turtle's long neck folds within the interior space formed by the carapace (above) and the plastron (below). The box turtle has a plastron made of two halves that close to provide further protection for the soft parts of the turtle inside.*

after National Wildlife Federation, "Earth's Amazing Animals"

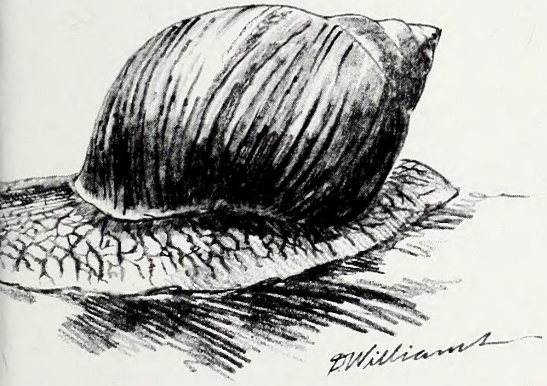
Portable Shelters

written by Lawrence S. Earley / illustrated by David Williams



***This industrious caddis** larva builds its shelter out of pebbles glued together with sticky secretions. Other caddis larvae build cases out of sand, bits of floating leaves and sticks. These shelters may protect the insect from predators, but also help it hunt for food in swift-moving water.*

after Wiggens, "Larvae of the North American Caddisfly Genera"



***Snails grow** their own shelters, crawling about the forest floor or the sea bottom with their houses on their backs. They add more spirals to their shells to accommodate their growing bodies. The hard, chalky shell evolved to protect this mollusk from predators and also to protect its wet skin.*

When animals seek shelter, they find it in a bewildering array of places. Inside a dead tree, just beneath the soil surface, on the underside of a leaf, under a rock in a running stream — you name it and some animal is using it or has probably used it to escape from predators, from the heat of the day or from inclement weather.

Some animals solve the problem of refuge by never leaving it. In fact, they bring it along wherever they go.

The most familiar of these animals is the turtle. This reptile has evolved a way to protect its soft parts by confining them between two hard shells, the carapace above and the plastron below. Confronted with danger, the turtle can completely withdraw its head, neck, legs and tail within its armored domicile, presenting a most discouraging exterior for the predator. The box turtle even has a hinged plastron that closes it off from the world more completely.

Did the turtle's legendary leisurely pace dictate the need for a built-in shelter? Scientists think the turtle's ancestors developed the shell as an adaptation to a life spent burrowing under ground. The shell consists of two parts, the leathery exterior and an interior of bony plates. The horny exterior seems to conform to reptilian scales, while the plates may be modifications of bones.

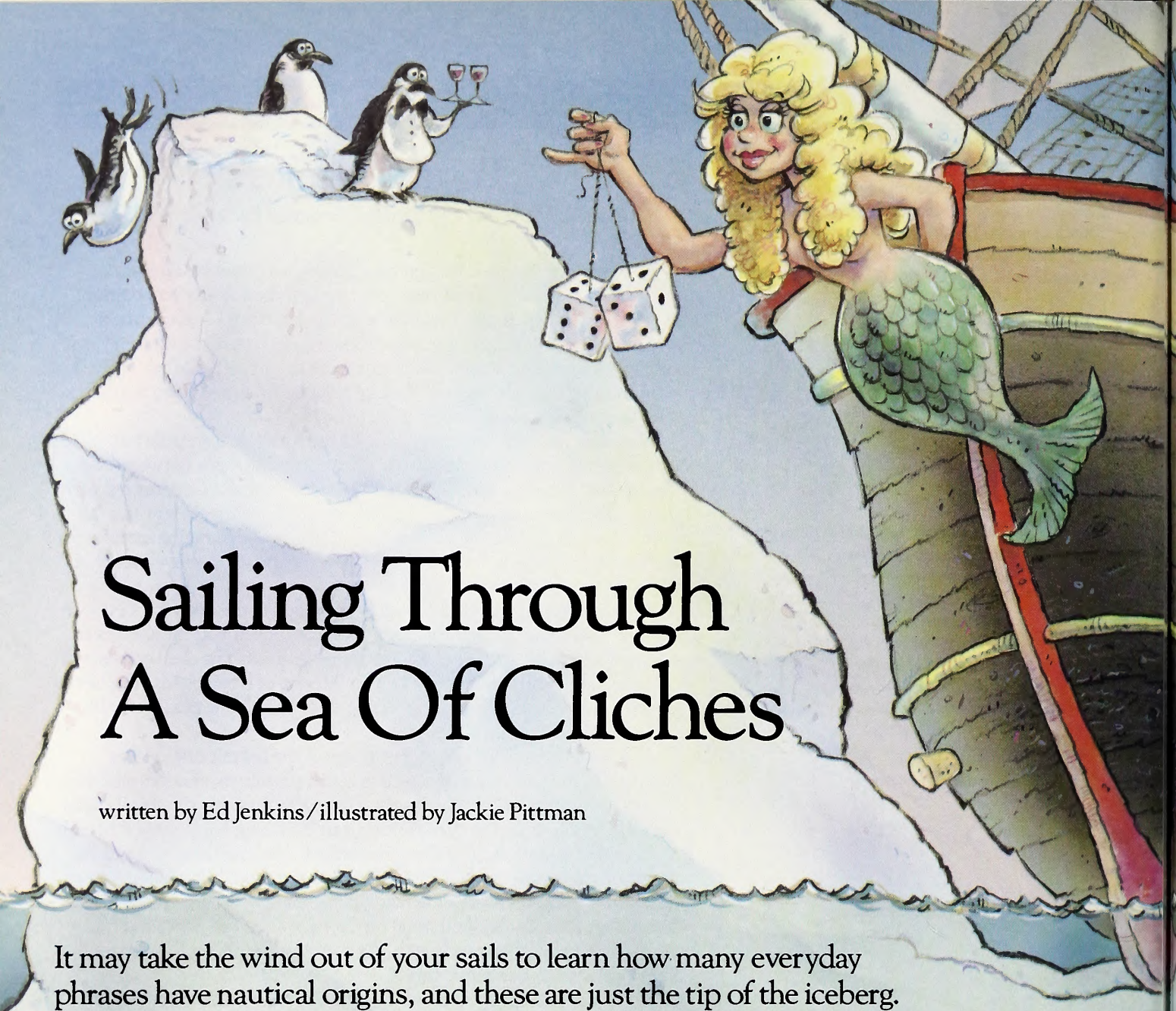
Another animal with a portable shelter is the hermit crab. After hatching in the water, this crustacean undergoes larval changes and then begins its lifelong search for a home. Hermit crabs favor the spiral shells of dead whelks and other gastropods, but they have been known to take to empty beer cans as well. Crammed inside, the crab moves about by manipulating a pair of walking legs outside the shell, but when it senses danger it withdraws its legs into the opening where its large pincer may discourage attack. The shell must be the right size. Too large, and the crab may be pulled out and eaten. As it grows, the crab will swap its home for a larger one many times.

Snails — both land and aquatic — have also evolved "mobile homes." Unlike the hermit crabs, snails are hatched with shells that grow larger to accommodate the growing body within. In the case of land snails, these hard shells not only protect the creature from predators, but also from drying out. When in danger, the snail withdraws its body within the shell, blocking the entrance with its large foot.

One of the most curious of portable shelters is the one constructed by the caddisfly larva. This aquatic insect will eventually rise to the surface of its cool stream habitat and emerge as a winged insect. But for most of its life it is a water creature, hunting for its food and trying to avoid being eaten.

One protective measure it takes is to build a case for itself out of tiny sticks, pebbles or bits of floating grass. The architectural styles of these tiny compartments are myriad, each species evolving characteristic tube, "log-cabin" or igloo forms. Some designs even help the caddis breathe by funneling continually fresh water over its body.

Of these four animals, we are probably most like the caddis and the hermit crab. In the hermit's anxiety to find a bigger home and the caddis's surprising building skills we find a mirror image of ourselves. With them and with all creatures we share a deep and abiding sense of our nakedness and vulnerability.



Sailing Through A Sea Of Cliches

written by Ed Jenkins/illustrated by Jackie Pittman

It may take the wind out of your sails to learn how many everyday phrases have nautical origins, and these are just the tip of the iceberg.

It is almost impossible to get through a day without hearing or using a phrase or cliche that has a nautical origin. Many of the everyday phrases may appear to be modern, but in fact, many can be traced to the days of sail. Here are some of these common expressions and an explanation of their origins.

A figurehead — *A figurehead is a leader in name only, who serves in the capacity without real authority and usually takes no active role.*

The figurehead of any vessel was thought to embody the ship's soul, and it was considered to be unlucky to go to sea without one. The carved figureheads placed on the bow many times were women, and this is the reason why ships are always referred to as "she" or "her."

Tip of the iceberg — *Means that one is faced with only a small part of a greater problem.*

Ship captains know that the underwater part of an iceberg can be many times larger than the top. Ships steer clear of them because they can strike an underwater part of the iceberg while the tip is still distant. The largest disaster of this nature occurred on April 14, 1912, when the British luxury liner *Titanic* on her maiden voyage struck an iceberg off Newfoundland and sank, killing 1,513 people.

Shake a leg — *Hurry up or get to something.*

This phrase goes back to the time when women were allowed to sail on British ships. The men would be called out in the mornings for muster and the women would be allowed to sleep-in. When the sleeping quarters were checked to determine that all the men were working, any woman sleeping in a hammock would have to show or shake a bare leg from beneath the covers so they could lie-in.

In the doldrums — *Down in the dumps, everything seems bleak and unlikely to change.*

The doldrums is a region of calm air near the equator. Clouds from the northern and southern trade winds on either side darken the skies. Sailing ships can be becalmed for weeks, and their crews become demoralized.

Shipshape or Bristol Fashion — *In good order; well-arranged; tidy.*

Bristol was the largest port in England, and had a worldwide reputation for order and efficiency.

H.M.S.
METAPHOR
D. JONES

Sailing Through A Sea Of Cliches

Lightning strike — *Used today to describe the withdrawal of labor at short notice.*

When seamen refused to sail on a ship they would strike (lower and store below) the sails and yards to prevent the ship from embarking on the voyage.

To cut and run — *To leave in a hurry.*

In olden sailing days, it would take quite some time and effort for the crew to be assembled to hoist the anchor. When ships were at anchor and danger approached, the captain sometimes would order that the hemp anchor rope be cut so the ship could flee more quickly.

To sail under false colors — *To use deception by assuming a false character.*

Pirate ships trying to get close to merchant ships would fly a false flag until they got close to their victim, then they would lower the false flag and hoist the "Jolly Roger" — white skull and crossed bones on a black background.

The devil to pay — *Indicates trouble ahead.*

In sailing days, the board beside the keel which was under constant pressure from the strain of the sails was called the devil board. Because of this strain, the seam between it and other boards would open up and leak, and the crew occasionally would have to fill or "pay" the seam with tar or pitch. The seam would have be be payed from the outside during the low tide when the ship could be rolled on her side. During this brief period, timing was crucial as the pitch had to be heated and ready to use before the tide rose again. If the tide rose before the work could be done, the ship would be out of commission longer than expected — and someone would be in serious trouble.

Plumb the depths — *To check things out carefully. Also, possibly to sink to the lowest level of misfortune.*

When ships were in shallow or coastal waters a man would be stationed forward to drop a lead (plumb) weight on a rope over the side to measure the depth of the water so the ship wouldn't run aground. The man taking the depths would holler "mark" followed by the number of fathoms (6 feet equals one fathom) to the bridge. Mark one meant the water was 6 feet deep. Mark twain (the old term used for the word "two") meant the water was 12 feet deep. Samuel L. Clemens, the famous author and lecturer, worked on riverboats as a pilot, and took Mark Twain as his pen name.

The coast is clear — *This means that no one is around to witness or interfere with a secret or illicit act.*

This phrase dates back to the days when smugglers landed their goods at night on Britain's southern coast. They would invent stories of phantom ships and lights to frighten away officials and outsiders to ensure the coast remained clear.

Mind one's p's and q's — *A warning to be careful of one's behavior.*

In olden days, sailors bought their drinks at taverns by the pints or quarts. As these p's and q's were served, they would be chalked on a board for later payment. If a sailor started to consume a number of drinks and get boisterous, he would be reminded of the number of p's and q's he had had and the debt that he would have to settle at the end of the night.

An albatross around one's neck — *This refers to the long-term guilt one has to bear for some wrong done.*

The albatross is a large sea bird that travels long distances over the sea flying almost effortlessly over the water. According to nautical superstition, it is considered unlucky to kill these birds because they are thought to embody the soul of departed mariners. Samuel Taylor Coleridge's *The Rime of the Ancient Mariner* published in 1798 tells the story of a sailor who killed one and when this brings bad luck to his ship, his shipmates hang the large bird around his neck as a sign of guilt. His guilt stays with him even though he goes from land to land warning against the cruelty of killing God's creatures.

Shape up or ship out — *Smarten up, get on with the job.*

This phrase became popular in the navy during World War II as a slang expression. A sailor would be threatened with a transfer to a less desirable assignment or another ship if he didn't improve his performance.

Press ganged into it — *To bring about extreme pressure on an individual.*

This refers to the way that men were forced into compulsory enlistment in the British Navy. Led by navy officers, press gangs were armed with clubs and warrants which entitled them to seize men and force them to serve in the British Navy under very harsh conditions. Some of these press gangs would work the streets and taverns before a ship was to sail, gathering enough men to make a crew.

On one's beam ends — *To be in a difficult or dangerous situation.*

In days of wooden sailing ships the beams of horizontal timbers stretched across the ship and supported the deck and joined the sides. During gales and heavy seas, vessels sometimes were thrown almost completely on their sides and were in danger of capsizing. At this point, they were on their beam-ends with the beams upright instead of horizontal.

To run the gauntlet — *To risk danger or open oneself for severe criticism.*

The gauntlet originally was a form of military punishment administered to sailors and soldiers in which the victim to be punished was forced to run between two rows of men who would strike them with whips and sticks.

Feeling groggy — *Feeling dizzy, unstable or intoxicated.*

In former times, it referred to drunkenness and got its name from the term "grog," which sailors in the Royal Navy called the rum they were issued. The term came to be used when Admiral Edward Vernon in 1740 ordered that the straight spirits the sailors were issued be watered down. Admiral Vernon usually wore a Grogram cloak made of coarse fabric of silk, mohair and wool stiffened with gum, and the sailors began calling the watered-down rum "Old Grog."

Any port in a storm — *When someone is in trouble, any assistance or offer of help, even if it causes one to lose face or accept help from one who is disliked, is welcomed.*

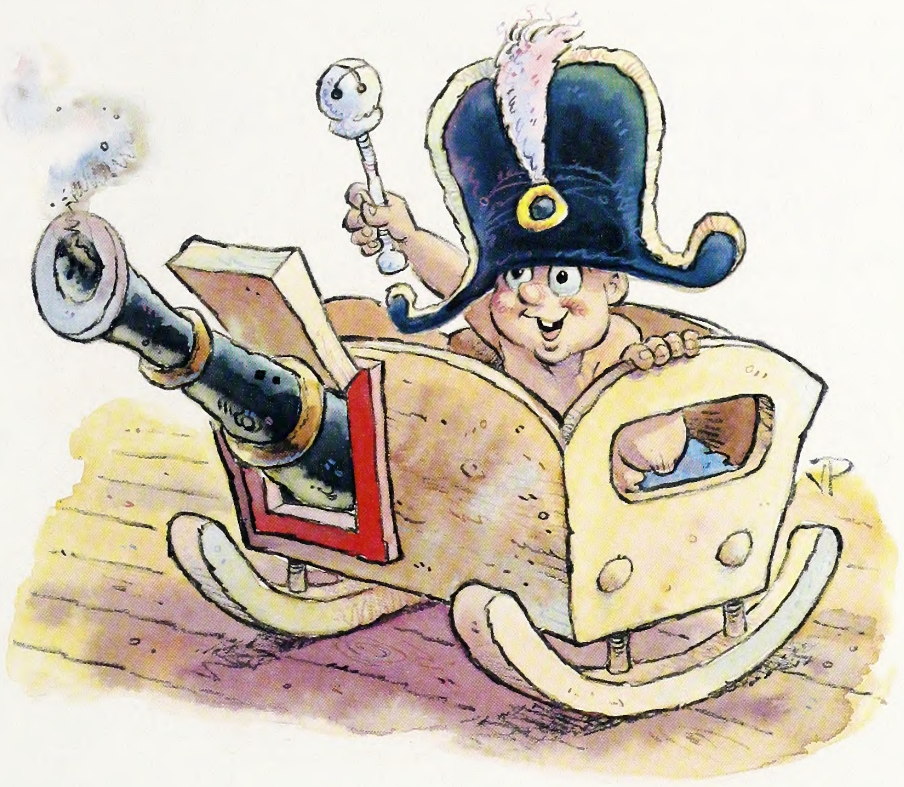
Certain ports, because of their reputation and business dealings were avoided by ships. However, when faced with the choice of riding out a storm at sea or going into one of these ports, the latter was always the choice.

Rack and ruin — *Means loss of fortune.*

Rack is from the old term "wrack" meaning wreck. Rack also was the term used to describe clouds and driving rain leading to a shipwreck.

To nail one's colors to the mast — *To make one's principles known and stick by them.*

In days of sail, if a crew was ready to surrender, the ship's colors or flag would be hauled down. On some ships, however, the crew would nail the flag to the mast so that it couldn't be lowered or surrendered. On these ships, the crews would stand and fight to the last man.



Son of a gun — *Usually used to describe someone who has done something unique or something he shouldn't have been able to do.*

The meaning of the phrase originated in days when women sometimes were allowed to sail with men on navy ships. The voyages were long and cramped, and when a woman was about to give birth, the only available space to do so was usually beneath or beside one of the ship's cannons where a screen could be erected — hence the term "son of a gun."

No shot in one's locker — *Nothing left, resources spent.*

In the days of sailing warships, the ammunition and powder were kept in the ship's locker. When all the ammunition was used up, the warship couldn't continue to fight.

On the stocks — *Something that is in hand but not yet completed.*

Ships were constructed from the keel up in wooden frames called stocks. Building ships was a time-consuming and expensive undertaking as over 2,000 average-sized oak trees would have to be felled to build one British Navy vessel. Construction of navy ships was so important to the government that entire forests were designated for this purpose, and the navy counted on the ships in the stocks to expand its fleet and power.

To dot the i's and cross the t's — *To pay attention to details or to be accurate.*

When a helmsman was steering an erratic course, he was said to be writing his name in the ship's wake. When this was noticed by a watch officer, the helmsman often would be rebuked by being told to "go back and cross the t's" (in his name).

Rate of knots — *Doing something at a "rate of knots" is doing it extremely fast.*

To help a ship determine its speed, a log line with knots tied at certain intervals was run out in the ship's wake and timed with a sand glass. A ship making 20 knots was traveling at 20 nautical miles per hour.

To know the ropes — *Refers to someone who knows exactly how to handle something or be able to get something done.*

In the days of sailing vessels, it was vital to know all the details of the ship's rigging in order to sail the vessel properly. Sailors needed to know every rope and how it should be handled and used. Those who had been around for awhile and did things properly knew which ropes to use.

Not enough room to swing a cat — *A confined area.*

The British Navy used flogging as a means of punishing its sailors. The whip used was called a cat-of-three-tails in the late 1600s, but later became a cat-of-nine-tails. This severe form of punishment was usually administered in an open area of the ship where there was room to swing the whip with the crew present. It was outlawed in 1875. It does not, as some believe, have a contemporary origin involving the swinging of a feline by its tail.

When my ship comes in — *An expected event that is to bring one good fortune, this phrase is more often used when there is little chance of this happening.*

This phrase originated with merchant traders who were waiting for their ships to return laden with goods which they hoped to sell at a profit so they could pay their debts.

Touch and go — *Risky circumstances with the outcome in doubt.*

This phrase had a nautical origin and described when a ship in shallow water would touch bottom but be able to continue without being grounded having "touched" but "gone" her way. May also refer to lighting the "touch hole" on a cannon to discharge it.

Between the devil and the deep blue sea — *A bad or precarious situation.*

If the devil board seam started to leak badly when the ship was at sea, the ship would be heeled over on its side and a crew member lowered over the side with a bucket of hot pitch to pay the seam. The bottom of the ship was covered with sharp barnacles and the ship could settle back in the water so it was a very dangerous thing to have to do.

Take the wind out of one's sails — *To frustrate one's plans or anticipate their argument.*

This was a sailing maneuver used in warfare in which a ship approaching from windward would block or rob the wind from the other vessel, causing it to slow down and become less maneuverable. It is a sailing tactic used in races today.

Three sheets in the wind — *To be intoxicated.*

A sheet is the rope or line attached to the sail that regulates the tension on it. If the tension is let off and the sheet is loose, the sail will flow loose in the wind. If more than one sail is loose or flowing in the wind, the ship is said to have "three sheets in the wind" which is an indication that the crew is out of control and must be drunk. ⊠

Too Hot For Bluegills?

You can still catch bluegills after they leave their spawning beds in the spring, but you may have to change your tactics.

written and photographed by Eugene Hester

The early morning was already warm, promising another summer scorcher. With hardly a ripple, the fisherman paddled the little johnboat toward a familiar point extending into the lake. He paused and looked for two underwater stumps which served to orient him. He knew that just beyond the stumps the water deepened quickly.

Pulling a cricket from the bait box, the fisherman baited his hook and ran the cork 5 feet up the line to match the water depth. The two little split shot on the line carried the bait to the lake bottom. His red cork

Too Hot For Bluegills?

rested motionless on the calm water surface, then wiggled and began to move. The fisherman responded with a quick jerk, and moments later lifted a fat bluegill into the boat.

By the time the hot sun began to bear down, the fisherman was headed for the boat dock with more than a dozen nice sunfish on his stringer.

That kind of success is duplicated throughout much of North Carolina many summer days, but it takes a little knowledge and experience. Our fisherman knew the underwater topography of the lake, and the habits of the fish. He also had the right equipment and good bait. Indirectly, he had also learned some important facts about water chemistry and fish biology, perhaps without even realizing it.

Bluegills are warm-water fish and are most active from spring to fall. Generally their level of activity increases as water temperature increases, but by mid- to late summer when it gets very hot, bluegills move deep into cooler water, and feed in shallow water only very early or very late in the day.

One day late last summer Bill Hinnant of Wendell was showing me one of his favorite bluegill fishing spots. As we fished along the edge of the pond I was impressed by his knowledge of bluegills and their habits. He had learned something from every fishing trip he had ever made, and he knew how to put all of these bits of knowledge together.

"I think I have tried every type of natural bait as well as about every artificial lure ever invented," he said, "and I have caught at least a few bluegills on every one I've tried. But I'll tell you right now that the two best live baits I've used are red wiggler fishing worms and crickets. When they're live and wiggling, and you put 'em in the right place, you're gonna get some fish."

I soon saw that his years of experience had taught him where the right places were. We fished a sequence of selected places: around stumps here, beside a brush pile there, along the old creek channel at the head of the pond and between some ash trees growing near deep water.

Later when we stopped at the boat dock to clean a few fish, Bill cut open one of the bluegills to show me what it had been eating. "See those," he said, as he pointed to dozens of little red worm-like creatures. "That's what they've been eating."

On his own, Bill had learned what fishery biologists learn from their studies — that in

Cricket

Waxworm Larvae

Red Wiggler

many waters, the number-one food of bluegills are those wormlike, *chiranomid* larvae. These are the immature aquatic life stages of midges. Less than an inch long, the larvae live in the water attached to rocks, tree roots, stumps or other solid underwater structures. When they grow large enough, they undergo a change, come to the surface and emerge as winged adults. The adults look somewhat like mosquitoes, but they don't have that pesky biting habit.

"I believe that's why red wigglers are such good bait," he said. "Though larger, they resemble these worms the bluegills are feeding on."

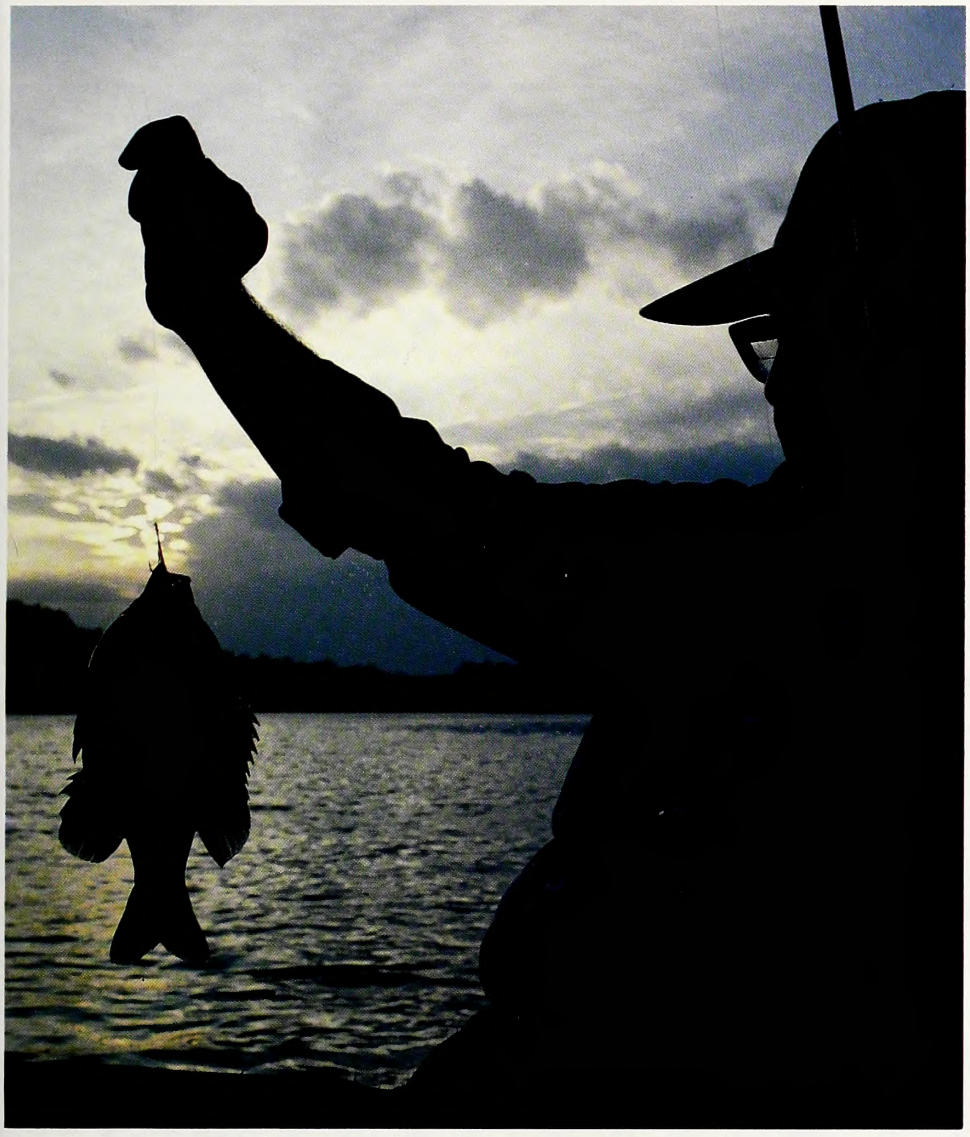
Bill gains his insight the same as many trout fishermen. That is, by opening the first fish caught, the fisherman sees what the fish are feeding on and can then choose a natural bait or artificial lure that imitates it.

I looked through Bill's tackle box and found an assortment of lures that imitate favorite bluegill foods. There were black gnats, red and black ants, wooly worms and popping bugs, as well as imitation grasshoppers, bees and dragonfly nymphs, all designed for use with a flyrod. I had the distinct feeling that Bill could catch bluegills on any of them. Though such lures are designed to be fished with a flyrod, some fishermen use them on spinning tackle by tying a plastic bubble on the line a few feet above the lure. When cast, the weight of the bubble carries the lighter fly behind it. Most bubbles float, but are made so water can be added to them to increase casting weight.

Sinking flies are the most productive in late summer, except sometimes at dawn or dusk when floating poppers are effective. It is important to fish underwater flies slowly, allowing them time to sink. Find water 3- to 5-feet deep and fish near the bottom. Fishing the lures without additional weight will retain their lifelike action and appearance, but it takes longer for them to sink down to where the bluegills are feeding. This is where patience pays off.

Small spinning lures like the Mepps or Beetlespin can also produce nice bluegills in hot weather, but you need to experiment with the speed of retrieve to reach the right depth. The fish will let you know when you get the right combination.

If bluegills retreat to cooler, deeper water in summer, why not fish in the deepest part of the lake? It is important to remember that many ponds and lakes stratify in the summer. That is, layers of water form. The top layer — perhaps 5- to 10-feet deep (deeper in very large lakes) — will be warm, but oxygenated. The bottom layer in the lake will be cool, but contain too little oxygen. In between these layers is a transition layer called the *thermocline*. Since fish must have



Bill Hinnant *admires a fat bluegill at sunset. During the hot summer months, the best fishing will almost always occur at dawn and again in late afternoon.*

oxygen, they have to stay in the upper layers, but they tend to avoid hot water, yet still feed on the pond bottom. Thus, the key is to find an area where the bottom is deep enough for moderate water temperature, but shallow enough to have a good oxygen supply.

In addition to the heat, bluegills also respond to light intensity. During bright daylight hours they move to the bottom, but at sunrise and sunset they may rise to feed briefly on the surface. One summer morning I had great success using a flyrod and popping bug in a clear pond before sunrise, but as soon as the sun peeped over the horizon, it was all over. Only by catching grasshoppers in weeds beside the pond, and replacing the popping bug with a fish hook and a split shot, was I able to get the bait down to where the fish had retreated from the sunlight. On cloudy days, however, bluegills often feed on the surface for longer periods.

Cape Carnes, a veteran fisheries biologist with the N.C. Wildlife Resources Commission, explained that bluegills generally begin spawning in May, starting in coastal areas and progressing westward across the state over a period of perhaps three weeks. When spawning is in full swing bluegill fishing is at its best. Bluegills may continue to spawn at intervals throughout the summer, but the frequency and intensity diminishes as the summer progresses.

Cape explained that while bluegills are commonly seen spawning in shallow water, they also spawn in water up to about 6-feet deep. They are less visible in deeper water, of course. I once saw two fishermen anchor their boat directly over bluegill beds in 4 feet of water while casting to the shoreline. They never even knew the fish beds were under them. Bluegill beds in shallow water often are heavily fished, but those in deeper water are harder to find and, therefore, if you locate such spawning areas you can be in for some real excitement.

Bluegills take a wide variety of natural baits. While red wiggler worms and crickets probably take more bluegills than any other baits, others are good, too. Ever since I was a youngster I have been chasing grasshoppers in weed fields for bait and catching bluegills with them. Mealworms, waxworms and grass shrimp are effective and sometimes commercially available. Catalpa worms and maggots can also produce nice bluegills, and some fishermen use small crawfish or little pieces of shrimp fresh from the seafood market. Bluegills are occasionally taken on nightcrawlers or small minnows, perhaps incidentally while fishing for bass or crappies.

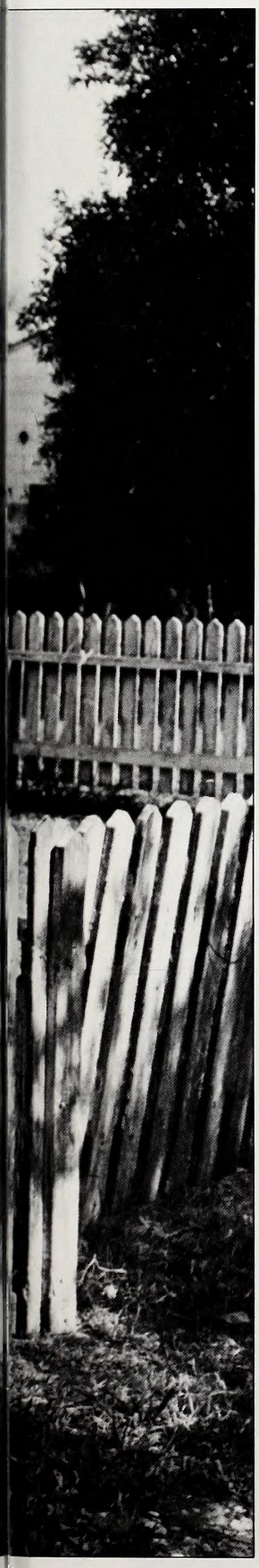
A cane pole, rigged with 6- to 8-pound test line is one of the best rigs to use for bluegills. A cork float and a small hook with a couple of small split shot is all that is needed. I prefer a size 8 hook with a moderately long shank. Split shot, if properly applied, can do more than provide weight. They can turn the fishing line into an effective depth-sounding device. Small split shots can be added to the line a few inches above the hook until the float stands upright when the bait is above the bottom. The float, however, will lie horizontal when the bait is on the bottom. Add split shot one at the time at two-inch intervals above the hook until the float functions properly. You should adjust the float by sliding it up or down the line so that the bait barely touches the pond bottom.

Recently, a successful fisherman took me to his favorite fishing spot in a 600-acre lake. His spot was an underwater ridge with water about 6-feet deep surrounded by deeper water. It was essentially a submerged island about 200 yards from shore.

"I found this ridge with my depth finder," he said. "It is a favorite spring spawning area, and bluegills also congregate here to feed at other times." He uses a somewhat different rig without a cork, tying a small sinker on the end of his line, then tying a short dropper line for the hook a foot above the sinker. By letting line out until the sinker barely touches the bottom, his bait hangs a few inches above the bottom. He keeps his line tight and a finger on the line above the reel. It's easier to feel a bite, and the bait is always just above the bottom, regardless of the depth.

Everybody who has ever caught bluegills appreciates the scrappiness of this bold little insect-eating sunfish, and it's hard to beat the flavor of a few freshly caught bluegills rolled in corn meal or flour and fried in peanut oil. Add a few hush puppies, and your fishing memories will be complete. ⊠

Tennis Shoes Drying On The Fence



Uriah And Sullivan Go Out Oystering

Ocracoke Portrait

Still reachable only by ferry, this barrier island retains much of its Outer Banks charm.

photographs by Ann Ehringhaus

Ann Sebrell Ehringhaus first came to Ocracoke to become a schoolteacher 14 years ago when she was 22 years old. A North Carolina native, she left several years later to study photography at The New England School of Photography in Boston, Massachusetts, and returned to begin gathering her "visual essay" of the island in 1979.

"Ocracoke is changing, the island landscape as well as the lifestyle," she said. "Cable TV has reached the island, a jail, a water system — all signs of 'civilization' — but Ocracoke is still people laughing, telling stories on each other, talking about the weather, and trying to carry the island's rich and unique past into an indefinite future."

During the past decade, Ms. Ehringhaus has exhibited her photographs in various parts of the Southeast, and worked as Artist-In-The-Schools throughout North Carolina. These photographs, and others, will be published by John F. Blair of Winston-Salem in 1988.

Ocracoke Portrait

"There is more time here, literally more time. Doing your work, visiting your friends, whatever, can all happen here. Days seem much fuller and much longer. Time on an island. You get to see the sun rise and the sun set, the dawn and that long, slow period of twilight."

— Cynthia Mitchell Loggins, artist and part-time resident

Albert's Store

The North End

Springer's Point

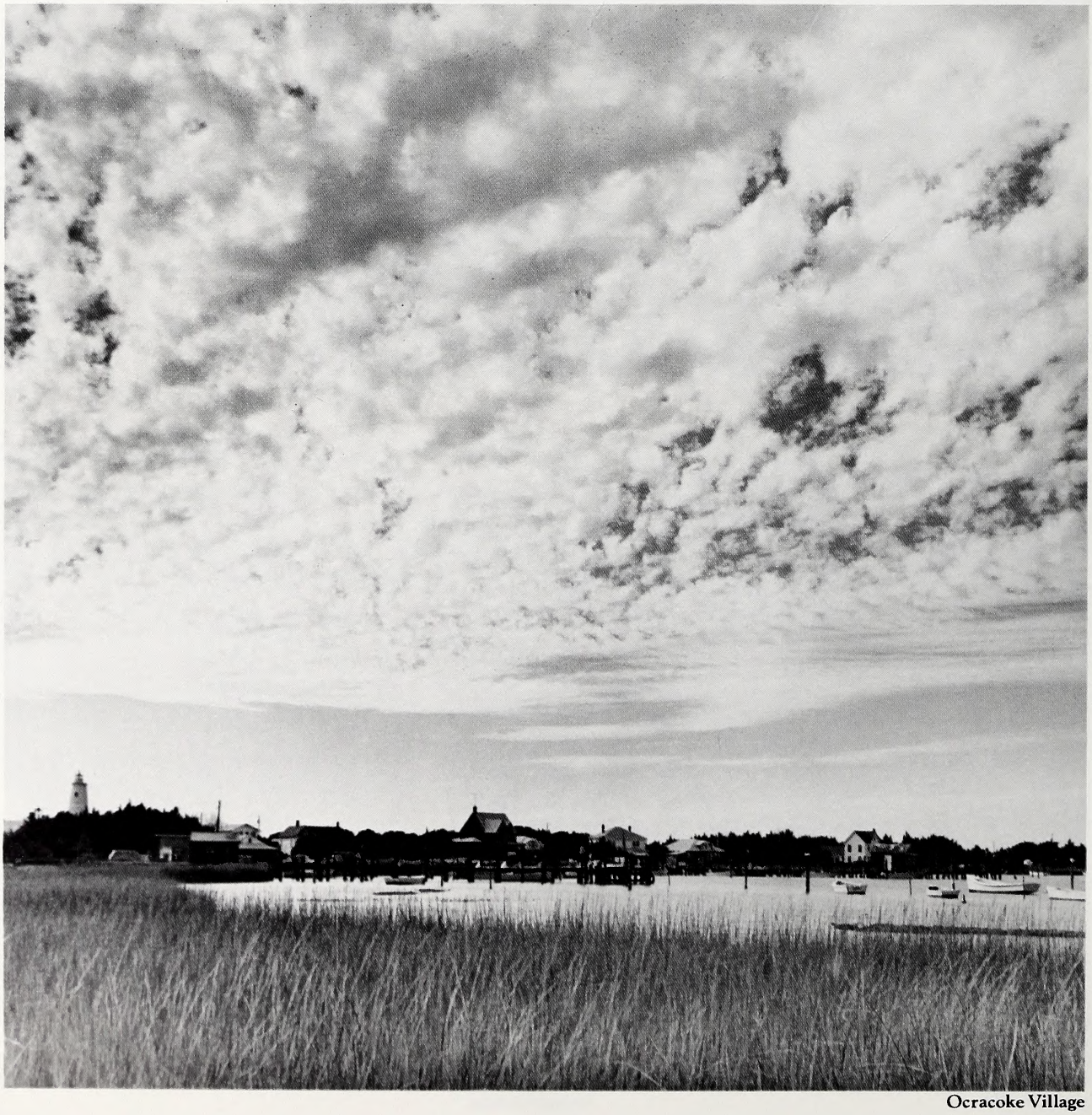
"It's a shame that it was ever named Springer's Point because it should've been Howard's Point instead. This is where the first recorded structure on the island was located, built by William Howard in 1759. Years later, this is still one of the highest points of land on the island. This is, I'm sure, where the first sand dunes were. I believe that the ocean was much closer at one time."

— Larry Williams, innkeeper
born on Ocracoke

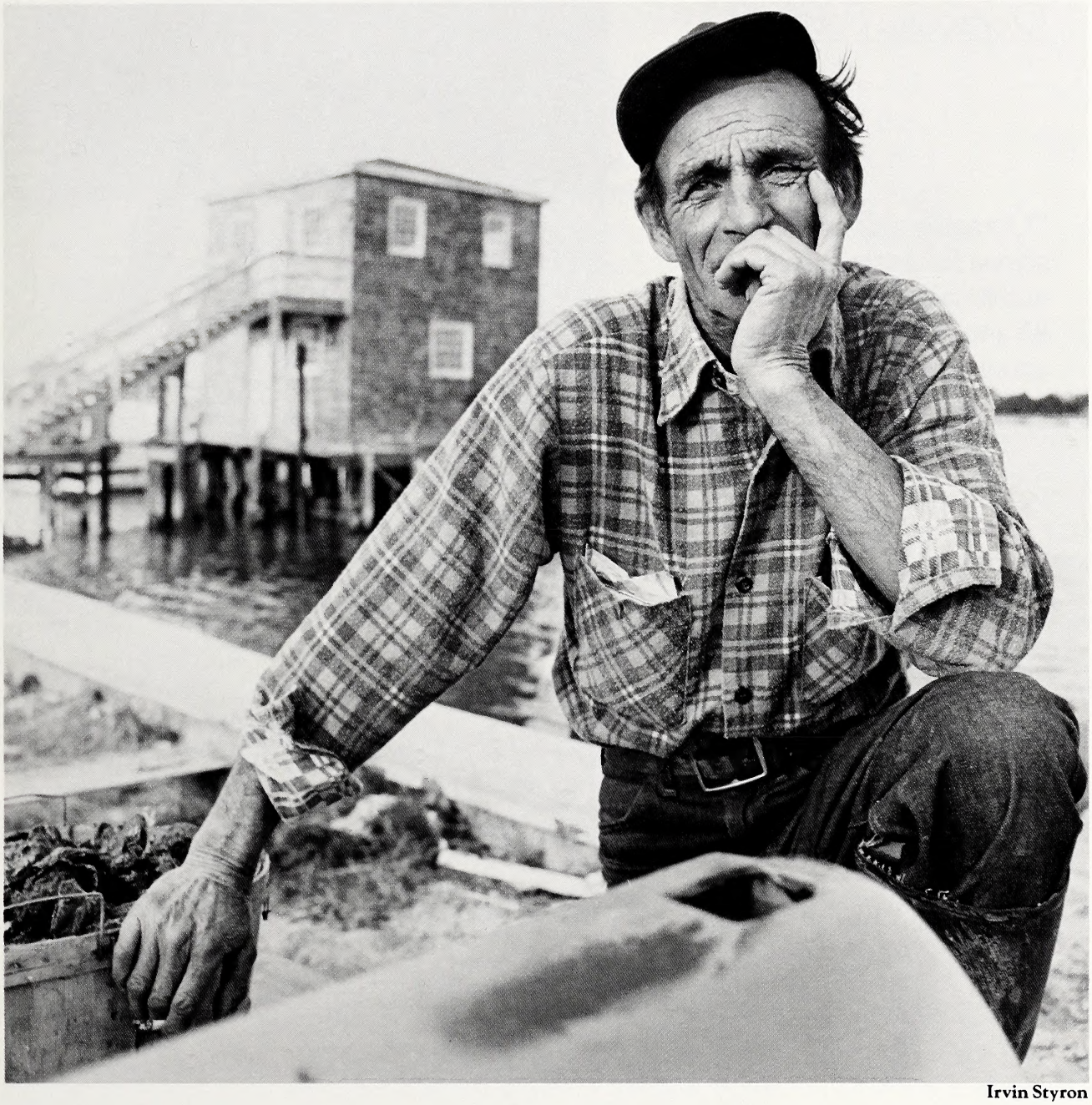
Ocracoke Portrait

"I'm at peace with myself here. It's a feeling you can't explain."

— *Elenora Hamilton, artist born on Ocracoke in 1911*



Ocracoke Village



Irvin Styron

"You know what I enjoy most is the elderly folks on the island. They have a story to tell that nobody else in the world can understand."

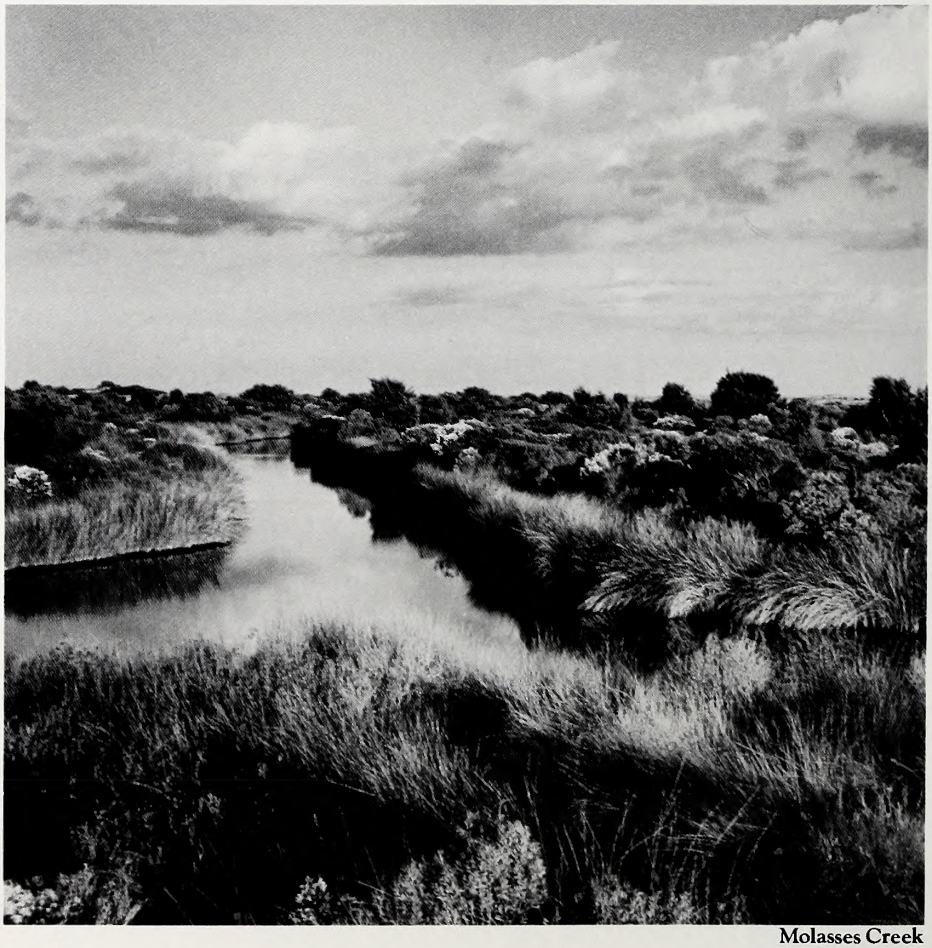
— Pat Ware, long-time visitor to Ocracoke

Ocracoke Portrait

"Ocracoke still has a real strong fishing industry and its own character — it's much more than just a tourist area."

— Howard Bennink, schoolteacher

Fishing Partners



Molasses Creek

"You either like Ocracoke or you hate it — nothing in between. It's the people and the concern people out here have for others. You can't put it into words. It's very simple, yet it's very beautiful. Here, it's hard not to enjoy the simple things in life."

— Carlos Umstead, long-time visitor to Ocracoke

Heading Home

PROTECTING WETLANDS
PART 2

WETLANDS AND THE LIMITS OF LAW

A platter of delicious seafood is but one of many things endangered by the contradictory laws and jurisdictions that govern the long-term welfare of our priceless, dwindling wetlands.

by Lawrence S. Earley

It's not difficult to destroy wetlands in North Carolina. You may destroy them illegally — you can take your chances of being caught because agencies responsible for enforcing wetlands laws are understaffed. (Of course if you are caught you'll pay restoration costs and fines.) Or you may destroy wetlands legally — loopholes and other legal sleights of hand may enable you to get around existing laws. Moreover, some of the biggest owners of wetlands are generally exempt from regulation.

The wetlands we're talking about include salt marshes, cypress swamps, pocosins and forested floodplains in the Piedmont. The link, whether you know it or not, between you and that seafood platter you ate last week. The difference between a polluted river and one capable of cleaning up its pollutants. Between a state rich in wildlife and one not so rich.

And though universally recognized for these services, wetlands are slipping through the protection net in North Carolina.

The costs of this flawed protection are serious. The results of several studies show that wetlands continue to be a vulnerable resource in the state.

- Between 1962 and 1979, 33 percent of North Carolina's pocosins were totally developed. Of the original 2.5 million acres of pocosins in the state, only 695,000 acres remain unaltered.
- Between 1954 and 1968, perhaps as much as 22 percent of our salt marshes were altered or destroyed.
- Between 1964 and 1974, 11 percent of our bottomland hardwoods were destroyed.
- Between 1962 and 1977, approximately 35 percent of our inland freshwater wetlands were altered or destroyed.
- Between 1970 and 1984, nearly 4,300 acres of coastal wetlands, mostly salt marshes, *were altered by projects permitted under existing laws*, although about 90 percent of these losses occurred before the Coastal Area Management Act came into effect in 1978. (These last figures — compiled by Margie B. Stockton and Curtis J. Richardson of Duke University from an analysis of 3,000 permit applications — do not include wetland losses to agriculture or forestry, both of which are exempt from regulation. And they don't include the losses from illegal activities.)

These figures are unfortunately consistent with wetland losses nationwide. A report issued by the U.S. Fish and Wildlife Service in 1984 found that of the approximately 215 million acres of wetlands existing at the time of European settlement, only 99 million acres were left by the mid-1970s. In just 20 years — between the 1950s and 1970s — 11 million acres of wetlands were cleared and drained, with annual losses

***View from** bygone era shows a coastal salt marsh filled for commercial purposes. Legislation passed in the 1970s bars development like this today, but the laws have limits.*

KEN TAYLOR

averaging 458,000 acres a year. North Carolina was one of nine states singled out as suffering the most extensive wetland losses, especially in the coastal pocosins.

To be sure, state and federal laws protecting wetlands (see "Wetland Laws — How They Work") are not useless. They have stemmed the wholesale losses of wetlands that occurred in the 1950s and 1960s, especially along the coast where the Coastal Area Management Act, Section 404 of the Clean Water Act and other laws combine effectively to protect salt marshes. The permit system also encourages consultations by regulators with landowners before permit applications are filed, reducing potential wetland losses. "We spend a lot of time these days doing that sort of thing," says Charles Hollis, chief of the regulatory branch of the U.S. Army Corps of Engineers in Wilmington. "Once [the wetlands boundary] is determined, we see a strong effort on the part of developers to stay out of those [wetland] areas. They don't want to get involved in the permit process unless they have to."

The National Marine Fisheries Service found that in 1978, 365 acres of wetlands were preserved because of the regulatory system, a figure that represented 85 percent of the total proposed for development.

Despite these successes, federal and state officials involved in wetland protection talk candidly about the limitations of wetland protection in North Carolina. Many wetlands outside of the coastal zone receive little protection. Moreover, as one biologist with the U.S. Environmental Protection Agency put it, when it comes to wetland laws, "We're only playing with half a deck."

Most criticism of wetland protection is directed toward Section 404 of the Clean Water Act, the only law that applies to wetlands throughout the state. The statute charges the U.S. Army Corps of Engineers with regulating the discharge of dredged or fill material into the waters of the United States and their associated wetlands. Landowners who wish to put a driveway in a marsh or a road through a swamp must apply to the Corps for permits. The permit application is reviewed by a variety of state and federal agencies — including the N.C. Wildlife Resources Commission — that forward their recommendations to the Wilmington office of the Corps. This office decides whether to grant the permit or not.

As final authority in the 404 process, the Corps becomes the whipping boy for both permit applicants and resource agencies. Applicants blame the Corps when their project fails to win a permit; resource agencies mutter when wetlands-stealing projects are permitted. But not all disagreements between the Corps and other agencies can be reduced to this kind of pattern. Surprisingly, disagreements arise over some of the most basic questions — what are wetlands and where are they?

On a humid May morning, I accompanied Ries Collier, a biologist with the Fish and Wildlife Service, to a bottomland hardwood site in the midst of North Raleigh. The year before, Collier had reviewed a permit application for a project on this site. A small creek ran through the pretty bottom, joining a bigger creek not far away. Other than the hum of traffic along nearby New Hope Church Road, there was no evidence that we were in one of the most heavily developed areas in the city.

"We thought it was a surprisingly good example of what we call an 'upper perennial stream,' " Collier said. "It runs in the midst of a highly developed urban area, yet it is a little oasis of good habitat. A lot of songbirds use the woods, but I also scared up some wood ducks along the creek last year and, believe it or not, there are deer here."

The project would have placed a road through a section of the small creek, channelizing its natural meanders and rerouting the creek through a concrete-lined culvert. Though the project was only 2.3 acres, Collier said, its potential effect was far greater than that. It would fragment the travel corridor for wildlife, an important function of a wetland. And there would have been many secondary impacts throughout the creek system because of the project, not the least of which would have been further development because of the existence of the road.

"I would suggest that the entire wetland would have been severely impacted if not destroyed as a consequence of this project," said Collier. "It's a relatively small tract, but there are so many projects similar to this in the Piedmont. Development radiates and gradually gobbles up all these little fingers

Wetland Laws — How They Work

Four state and federal laws provide most of the regulatory authority over development in North Carolina's wetlands. Wetland protection is concentrated in coastal wetlands, especially marshes in the 20 coastal counties covered by the Coastal Area Management Act. Only Section 404 of the Clean Water Act applies to wetlands throughout the state. There are no state laws protecting wetlands outside of the coastal zone.

N.C. Dredge and Fill Act (1969). Requires permits for "excavation or filling begun in any estuarine waters, tidelands, marshlands or state-owned lakes." Currently merged with the Coastal Area Management Act and administered by the Office of Coastal Management.

N.C. Coastal Area Management Act (1974). Requires permits for development activities in areas of environmental concern (AECs) in 20 coastal counties. AECs are defined as the estuarine system, ocean hazard system, public water supplies, and natural and cultural resource areas. Affected wetlands: marshes subject to regular or occasional flooding by tides. Administered by the Office of Coastal Management under the N.C. Department of Natural Resources and Community Development. Exempts certain activities including agricultural or forestry production which does not involve the excavation or filling of estuarine or navigable waters.

U.S. River and Harbor Act (1899). Section 10 requires a permit for building structures in navigable waters. Administered by U.S. Army Corps of Engineers. Dredging, stream channelization, excavation and filling also require permits under Section 10.

Federal Water Pollution Control Act (1972, amended by Clean Water Act of 1977). Section 404 requires a permit for the discharge of dredged or fill material into the waters of the United States. Administered by the U.S. Army Corps of Engineers. The Corps can issue a permit if (1) the discharge will not have significantly adverse environmental impacts, (2) no practicable upland alternative exists for the project and (3) the project is "water dependent." In the 20 coastal counties covered by CAMA, a joint permitting process allows a project permitted by CAMA to automatically receive a Section 404 permit.

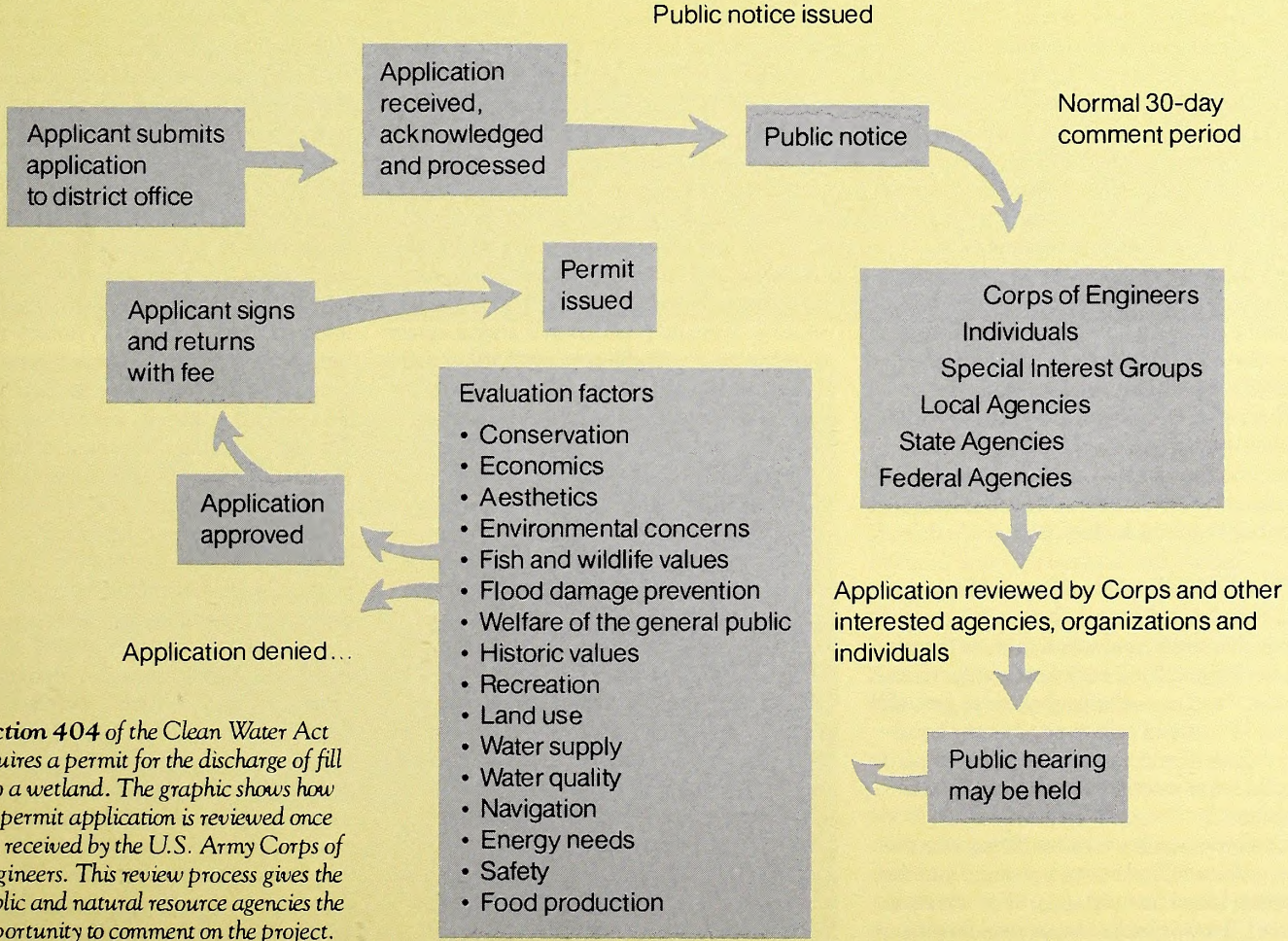
Activities exempted include normal farming and silviculture, construction of irrigation ditches and farm, forest or temporary mining roads.

DEBORAH CONGER

As one biologist with the U.S. Environmental Protection Agency put it, when it comes to wetland laws, "We're only playing with half a deck."

Timber operations, *like this cypress clear cut in the Roanoke River bottomlands, are exempt from wetland-protection laws. Timber growers maintain that logging does not destroy the swamp, but only removes trees.*

Section 404 Permit Review Process



Section 404 *of the Clean Water Act requires a permit for the discharge of fill into a wetland. The graphic shows how the permit application is reviewed once it is received by the U.S. Army Corps of Engineers. This review process gives the public and natural resource agencies the opportunity to comment on the project.*

and island corridors of undeveloped wetlands."

Collier recommended denial of the permit, but the Corps granted it. "The Corps decided the wetland did not extend beyond the banks of both creeks. We considered more of the bottomland to be wetland than the Corps."

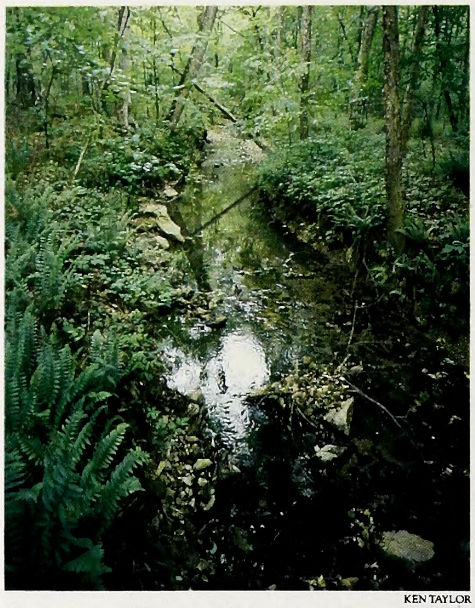
I asked him how he and the Corps could disagree on such a fundamental question. After all, shouldn't wetland laws be based on firm notions of what wetlands were? He said it wasn't that easy.

"There are three things that define a wetland: whether it can or does support wetland plants; whether the soils are hydric, which is to say they are either saturated or flooded for a predominant amount of the time; and the hydrological regime [frequency of flooding]," Collier said.

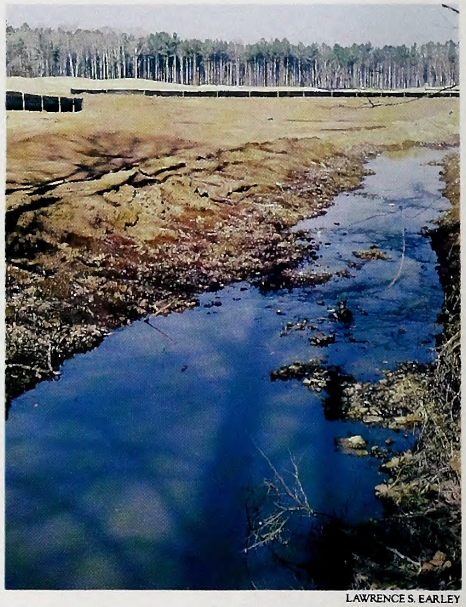
To aid in establishing the boundaries of wetland areas, lists of wetland vegetation and wetland soils have been compiled. As we walked through the close underbrush, Collier pointed out the wetland tree species. He admitted that there wasn't a lot of obvious wetland vegetation on the site. River birch grew there, which is a "wetland obligate" — it grows only in wetlands — and there were some "wetland facultative" trees — trees that usually grow in wetlands — such as sweet gum and swamp chestnut oak.

"But the soils are the key to understanding where the wetland is out here," Collier said as we reached the bank of the larger creek. Pointing to the flat floodplain on the other side, he said, "The boundary of upland and wetland would occur somewhere over there." To decide exactly where, he had taken soil corings.

"Sure, it's not an exact science but it could be made a whole lot more scientific than the way it has been practiced in the past." He cited the Corps' work load — six biologists to cover 100 counties — to explain why on small streams in the Piedmont and mountains Corps biologists consistently decide that wetlands exist only between creek channels.



KEN TAYLOR



LAWRENCE S. EARLEY

***Forested bottomlands** in the Piedmont and mountains perform important ecological services for man and wildlife, but are being increasingly cleared. As good upland sites in growing cities are developed, wetlands become more valuable for building purposes. Meanwhile, federal agencies authorized to protect wetlands sometimes disagree over how much land adjoining streams is wetlands, hindering their protection.*

Charles Hollis of the Corps of Engineers maintains that such disagreements don't occur that often, and when they do there's a reason for it. "They're not easy judgments," he says, "and considering that we're probably doing 75 wetland calls every day, the handful of disagreements over bottomland hardwoods is not worthy of saying 'we have a problem.'"

Conservationists nationwide say that the Corps does indeed have a problem, and the ultimate losers are wetlands. "For whatever reason, the Corps has always read its responsibilities to protect wetlands very narrowly," says Derb Carter, an environmental lawyer from Raleigh. "There's a series of court rulings based on challenges, primarily by environmental groups, that have extended the protection to the full extent that these organizations think Congress intended originally."

To Hollis, however, environmentalists want Section 404 to be more than it was ever intended to be. Section 404, he says, was not designed to prevent wetland development. The permit-review process attempts to balance a number of competing values — wetland protection is an important value but so is a "public interest" value such as economic development. The Corps' decision on permits is based on several factors, and not only on the presence of wetlands.

"The permit program accepts the fact that there will be some permits issued [that will cause] some wetland losses," he says. "We're not asking the Fish and Wildlife Service to agree with us. We're asking them to tell us what are the impacts, and we're given the job of balancing the issue. Are there benefits that offset the losses?"

The benefits are often economic ones, and these values can sometimes be considerable, which is why wetland determinations are so often contentious and acrimonious. Albert Radford, a noted ecologist at the University of North Carolina at Chapel Hill, relates how he was asked to serve as an expert witness at a court case involving wetland boundaries in a large tract of Louisiana bottomland hardwoods.

"When I got off the witness stand at the end of the day," Radford says, "I was accosted by five people. They were ready to kill me. The issue was this. As wetlands, these 20,000 acres were appraised at $850,000. As nonwetlands, they were worth $16 million."

Critics find other problems with the Corps of Engineers' handling of Section 404. Corps decisions not to exert its jurisdiction over certain kinds of wetlands have outraged environmentalists and prompted lawsuits. A notable example was the case of First Colony Farms in Dare County where the Corps decided that a 34,000-acre tract of pocosins could not be considered wetlands because of the existence of drainage ditches, while other pocosins unaltered by ditches were wetlands under Section 404. A lawsuit resulted, and in 1985 the U.S. District Court for the Eastern District of North Carolina termed the Corps' judgment "arbitrary and capricious."

At stake was the water quality of the Albemarle and Pamlico sounds. Seventy percent of the fish and shellfish harvested in North Carolina is taken from Pamlico Sound and its tributaries. According to many conservationists, the vast fishing resources of both estuaries are being threatened by the continued drainage of the pocosins on the Albemarle-Pamlico Peninsula. They fear that the additional fresh water is upsetting the salinity of the sounds upon which fish and shellfish depend.

KEN TAYLOR

A Corps of Engineers' *decision that ditched pocosins were not wetlands under its jurisdiction allowed these First Colony Farm pocosins to be cleared.*

Loopholes in *the law allowed developer to dig ditches through this pocosin, drain the wetland with the aid of a pump and excavate the peat soil. Corps of Engineers say that the law only regulates the discharge of fill into a wetland, not excavation or draining. Wetlands are destroyed either way.*

Charles Hollis defends the Corps' judgment on First Colony by pointing out that the area could hardly function as a wetland if it was drained of its water. "These are places where you go out even in the spring and it's almost like walking in ashes," he says. "You could stick your arm down in this

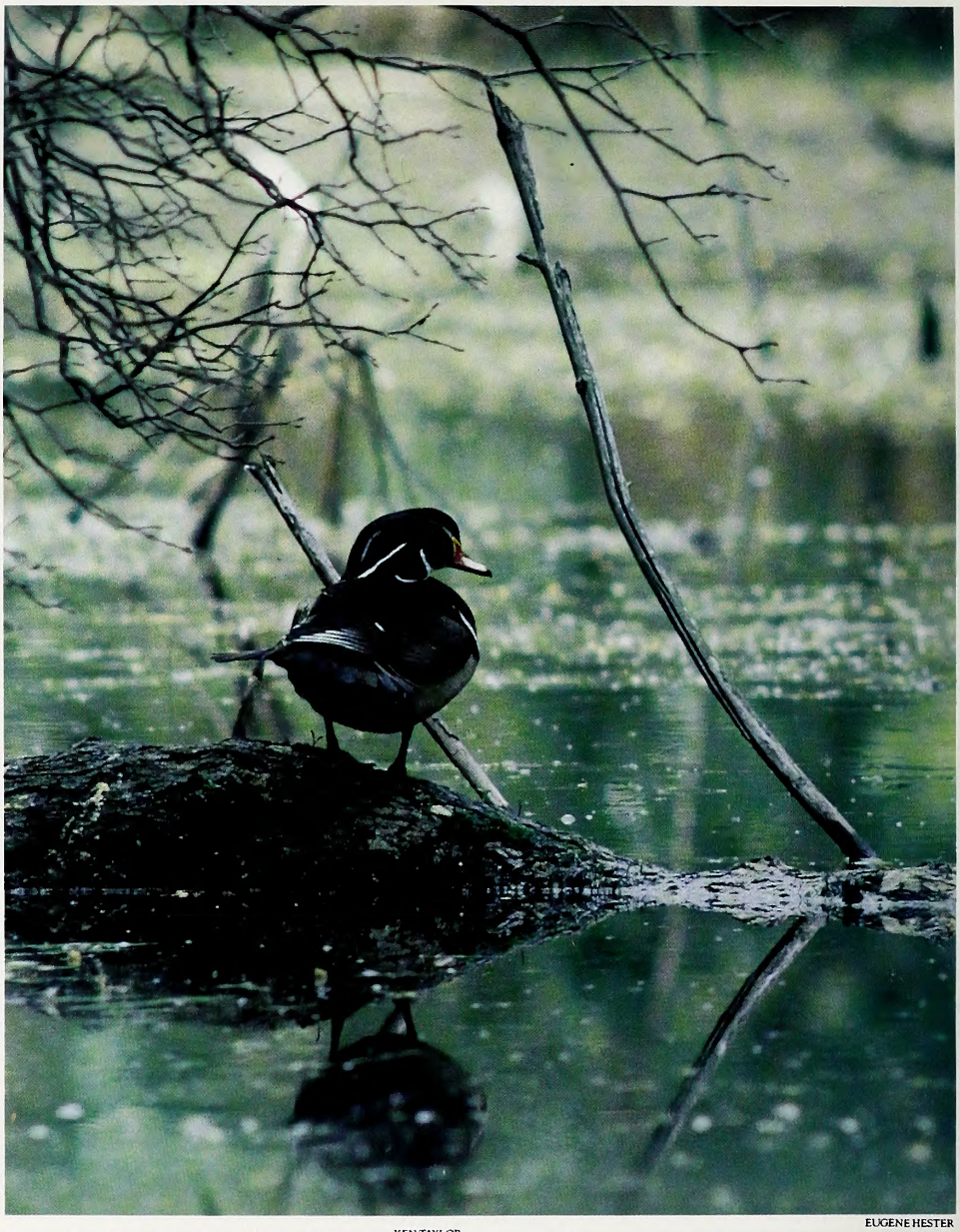
"In the inland areas, some people think that a creek is just a ditch with a sewer pipe in it. They don't see that it has any value."

stuff, which is decomposed peat, and there's no moisture in it. This is just not a wetland."

But Derb Carter, who sued the Corps over this interpretation on behalf of the National Wildlife Federation and other conservation groups, says that using only one criterion — the soil saturation — is too subjective. "Everyone admits that these areas are still covered with wetland vegetation, and that hydric soil — in this case peat soil — is still there," he says. "The Corps says that installing those ditches has changed the hydrology to the extent that the area is no longer a wetland. The environmental groups in the suit contended that putting ditches in a pocosin is like cutting a sponge in half. The ditch has no effect on the hydrology of the area."

The decision on whether First Colony's ditched pocosins are wetlands has still to be made, but the Corps won't be making the judgment. In 1986, the EPA entered the fracas and made the 19 counties surrounding the Albemarle and Pamlico sounds a "special case" area. In those counties the EPA will now make the jurisdictional calls on 404 permit applications involving pocosins.

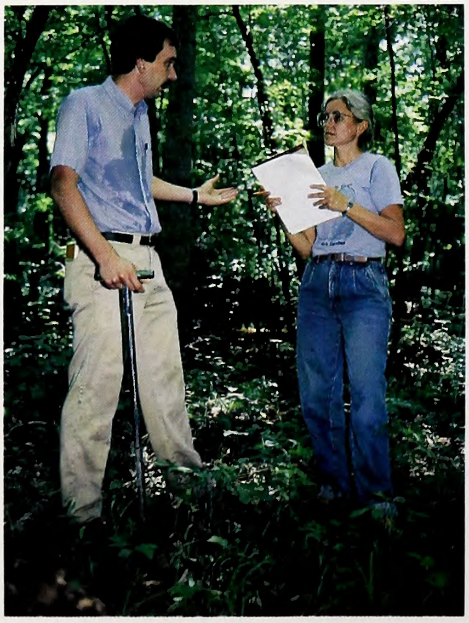
Biologist Lee Pelej will be making the investigation for EPA. "I don't think there's anything complex about pocosins," he says. "I think the literature indicates they are important. Perhaps in some people's minds there is a difficulty when they become ditched and drained, but that hasn't been a major problem. Not for me. I believe First Colony is a complex issue because of the size



EUGENE HESTER

Tangled wetland *along a Piedmont stream is perfect habitat for wildlife species like the wood duck.*

KEN TAYLOR



Durham city official *Vonda Frantz (right) consults with Corps of Engineers biologist Ken Jolly. Such consultations before a permit application is filed can reduce the amount of wetland acreage affected by a project. Better than 95 percent of all permit applications are approved, most with modifications.*

U.S. Fish and Wildlife *biologist Ries Collier studies vegetation to find wetland boundaries.*

LAWRENCE S. EARLEY

of the area and its history. We're going to take a good look at it."

Derb Carter applauds EPA's decision to make the jurisdictional call on the eastern pocosin lands. "EPA has a broader view of the objectives of the 404 program," Carter says. "I think we'll get jurisdictional determinations more consistent with the objectives of the program than we would have gotten from the Corps."

Another serious flaw in the ability of the 404 program to protect wetlands has to do with the Corps' limited jurisdiction over activities in wetlands. The flaw has long been known. Section 404 bars the "discharge of dredged or fill material" in wetlands, but it does not prevent a landowner from draining his wetlands, from clearing all the vegetation from it, or from excavating the soil — as long as he deposits the fill, the wetlands soil, onto an upland site. Developers have sometimes used this loophole to make an end run around wetland laws.

Conservationists and natural resources officials say that this is what is happening on a development project near Wilmington.

Beginning in 1986, according to state and federal sources, a developer set about to drain a wetland that occupied a strategic part of his subdivision development, a project called Beau Rivage Plantation. The wetland — a 90-acre pocosin — was perched on relatively high ground. The developer installed a perimeter ditch and interior ditches into the pocosin and placed a pump in the wetland. The drained and pumped water was carried into an adjacent forested wetland which drained into the Northeast Cape Fear River. When the soil was dry, earth-moving equipment excavated the peat layer and brought it to a processing area where it was milled and then dumped on high ground.

At various times throughout the year, representatives from the Corps of Engineers, EPA, Fish and Wildlife Service and Wildlife Resources Commission visited the site — the Corps was consulted on the legality of the operation before it was begun and as it was being developed. But even though all agreed that a bona fide wetland was being destroyed, no permit was applied for and none was demanded because there was no discharge of fill into the wetland.

"We have never disclaimed our jurisdiction over the area," says Charles Hollis. "Eventually we will have to agree that it doesn't have wetland characteristics anymore, but the question will probably never be asked. [The developer] doesn't plan to build houses on it anyway."

Several officials talked with deep forboding about this project. "I think it's a very dangerous precedent," says Mike Gantt, field supervisor for the Fish and Wildlife Service in Raleigh. "I think developers could begin to see that this is a way to get around the law. And while the Clean Water Act does have some deficiencies, its basic intent of restoring and maintaining the biological integrity of the nation's waters is being thwarted by actions such as this."

According to Lee Pelej, "It's frustrating, especially to the general public. [Dredging in 404 wetlands] is one of the biggest problems we're facing. That's my opinion. When I see the kinds of things you see around Wilmington it really makes me feel like I wish we could do something else."

Hollis believes that the case will not set a precedent because the project was expensive and because the perched position of the wetland is unique, lending itself more easily to drainage than most wetlands. "We're concerned about it," he says, "but we'd be even more concerned about it if we believed that a lot of properties lend themselves to that kind of manipulation."

Despite his optimism, he agrees that loopholes like this one make a mockery out of the intent of the law. "We've been screaming and yelling about this for 10 years. What we say is, to the extent that the law applies, it does protect. But it doesn't apply very far. A great deal of wetlands have been lost because of folks working around that fact."

Although loopholes in the 404 program allow these kinds of activities to go unregulated, other activities are unregulated by design. "Normal agriculture" and "normal silviculture" are exempt from the provisions of this law, and thus require no permits. Although the phrases are somewhat ambiguous, the potential land involved by farming and forestry activities is quite large. According to a 1978 study by William Doucette and Joseph Phillips, these two activities pose the most serious threat to wetlands in eastern North Carolina. Large-scale agriculture and timber companies own extensive land-holdings here, and have drained nearly one third of all of the wetlands in the 17 coastal counties studied by the two researchers. If all wetlands owned by agriculture and forestry interests were drained, nearly two thirds of all wetlands would be destroyed in these counties.

Another frequent complaint about wetland protection in North Carolina is that it is most active in the coastal areas, where most of the wetlands occur, but is spotty in the Piedmont and mountains. A variety of reasons are to blame, including inadequate manpower to review applications. According to Charles Hollis, the Corps has only six biologists to make site visits in all 100 counties. The Fish and Wildlife Service, meanwhile, musters only four field biologists to handle approximately 330 permit applications a year. Permit review constitutes only about 25 percent of their work load. The Wildlife Resources Commission has two biologists to review permits.

But staffing constraints are not the only reason why the coast receives better protection. Several officials point out that inland wetlands don't have the same image as coastal wetlands.

"It's an educational thing," says John Parker, inland 404 review coordinator who works for the Division of Coastal Management. "The [coastal] public has accepted that [salt marshes] are valuable, or the freshwater marshes up in Currituck. In 1972 and 1973, people were still asking for permits to cut a canal system through *Juncus* marsh, or put spoil in the marsh and trailers on the spoil. Nobody's doing that any more.

"But in the inland areas, some people tend to think that a creek is just a ditch with a sewer pipe running in it. They just don't see that it has any value. Others might see it as Mother Nature's sponge, or as a travel corridor for wildlife, or as a scenic area."

It's the small bites out of these scarce freshwater wetlands, especially in the developing Piedmont, that concern state and federal officials the most. "It's two acres here, 10 acres here and seven acres there," says Mike Gantt. "Over the course of the year it adds up."

"We're being little-bitted to death," adds Don Baker, permit review coordinator for the Wildlife Resources Commission.

It's clear that despite the protection intended by state and federal lawmakers, North Carolina's wetlands are still slipping through the protection net. Sometimes in dribs and drabs, sometimes in massive acreages, they are being lost. What will it take to reverse the trend?

Improved laws, for one thing. Former Department of Interior Assistant Secretary G. Ray Arnett complained in 1984 that the 404 program was "so flawed, it is no longer a useable tool to adequately protect wetlands." This article has indicated some of the reasons he might have said that. More conservation incentives are also necessary. One important incentive, the so-called "Swampbuster provision" of the 1985 Farm Bill will be examined in the third part of this series.

But perhaps most important will be a change in the way we think about wetlands, a change that must show up in the individual landowner and in local government bodies. It's in understanding the value and vulnerability of wetlands that we can best protect them — those marshy, swampy and boggy places that we have never quite accepted. ⊠

Prepares For National Match

Ledford Wins Hunter Education Tournament Again

Written and Edited by Mark Taylor

The nine boys from Thomasville knew just what to do. They jumped into the winner's circle, accepted their trophies, donned the blaze-orange cap of champions, then fell into place and grinned widely for all the snapping shutters. After all, it was the fifth time in nine years that Ledford Senior High School students had shot their way to the state championship during the state's annual Hunter Education Tournament, and their score of 2,294 points set a state record.

The boys' predecessors in 1985 even brought home the most coveted trophy from the North American Hunter Education Championship. This month, Ledford students are going to Logan, Utah to try to carry on what's becoming a tradition.

Equally enthusiastic about winning the top trophy in the junior division were seven students from Forbush Elementary in Yadkin County.

Those top honors in both divisions were bestowed after students battled misting rain and gusting, chilly breezes one Saturday last April to prove their abilities at trap and rifle shooting and archery. Some students, who hadn't expected the 40-degree weather, shook from the cold as they pulled back their arrows and aimed for the bulls-eyes.

Dale Lambeth of Ledford High scored the highest individually in the senior division with 582 points. Paul Ratledge of Forbush Elementary also set a new state record in the junior division with his score of 530 points.

TERRY SHANKLE

Still Champs: *Ledford Senior High School in Thomasville finished first for the second year in a row in the annual North Carolina Hunter Education Tournament in Kinston. From left to right, kneeling, are Todd Bodenheimer, Brad Quesinberry, Jason Everhart, Tony Uselman and Brian Motsinger. Standing are Dale Lambeth, Ken Fowler, District 6 Safety Lieutenant Michael Lambert, Ledford Coach Steve Cline, Tournament Director Captain Wilton Pate, Jay Yandle and Warren Schucker.*

Capt. Wilton Pate, safety coordinator for the N.C. Wildlife Resources Commission, said the tournament was designed to allow students in the public schools to develop their shooting abilities as well as general knowledge about wildlife, game laws and hunter ethics.

Although students competed only in trap, rifle and archery events to score points toward the championship, safety officers took them to nine stations on a hunter-safety trail to test their knowledge of game and wildlife laws. They were also instructed to judge distances and in some cases tell the kind of weapon they would use.

Nearly 200 volunteers from Seymour Johnson Air Force Base, the N.C. Wildlife Federation, Camp Lejeune Marine Base, the N.C. Rifle and Pistol Association and a number of wildlife clubs across North Carolina helped usher the students through the competition. The clubs included the Sportsman's Wildlife Club of Greensboro and wildlife clubs from Pitt, Lenoir and Cabarrus counties.

— Angie Hill

North Carolina Gets Closeup Look

North Carolina: People and Environments by Ole Gade, H. Daniel Stillwell and Art Rex. Published by GEO-APP Publishing, Appalachian State University, Box 9188. $28.00 (includes mailing).

North Carolina has experienced many changes in the past few decades, and these are chronicled in this book by Appalachian State University geographers Ole Gade, H. Daniel Stillwell and cartographer Art Rex. This book examines every region of the state, noting environment and climate, patterns of land-use, environmental problems and changes in its human population.

The book is comprehensive, informative, easy to read, and illustrated with maps, charts, drawings and photographs. Those interested in the past and the future of our state will find the book interesting and useful.

Two Receive Governor's Awards

Two Wildlife Commission employees recently received Governor's awards from the N.C. Wildlife Federation for their contributions to conservation in a number of areas.

Dennis Luszcz of Edenton was named Sportsman of the Year. He serves as waterfowl project leader for the Wildlife Commission, and has been especially active in the Atlantic Flyway Council. Luszcz has played a key role in developing a study of movements and mortality factors in Canada geese in addition to developing a statewide management plan for this important species.

Sergeant Clarence Beaver of Elkin was named wildlife enforcement officer of the year. He has been a wildlife officer for 20 years, and is active in giving programs on wildlife to schools and promoting hunter and boating safety in addition to carrying out his regular enforcement duties.

Just Another Night's Work

Wildlife Officer Takes A Ride To Remember

Chasing fire-lighters is dangerous work, and no one knows this better than wildlife enforcement officer Jim Geouge of Cedar Mountain in Transylvania County. Last fall, he and his fellow officers made 28 fire-lighting cases in their three-county work area. In the process, however, Geouge took a ride that he won't forget.

Late one night, Geouge and officer Roger Gibby were working on a remote section of Pisgah National Forest. A backup team of wildlife officers, Ernie Stiles and Roger Hebb, were located in another vehicle some distance behind them.

Late that night, Geouge and Gibby saw a lone vehicle move slowly up a logging road, sweeping its headlights across a small field. The lights illuminated the eyes of a deer, and a shot rang out.

Immediately, Geouge and Gibby radioed their backup team and asked them to block the road. "We are in pursuit," was Geouge's last transmission, as he wheeled his jeep around. Soon, the officers were fighting the steering wheel to maintain control as the jeep slewed around the curves in a high-speed chase.

"We were gaining on the poachers, but then one of our front wheels caught some loose dirt on the edge of the road and the bank gave way," recalled Geouge. "It was almost like slow motion. The jeep turned and went over the bank, and there wasn't anything we could do except ride it out."

Fortunately, the vehicle was pointed straight down hill and didn't roll, but that plummeting ride down the near-vertical bank in utter darkness was more terrifying than any amusement park roller coaster.

"We ended up with the jeep standing on its nose stuck in the middle of a creek," said Geouge. Fortunately, neither man was injured. They groped in the wet darkness for the radio and told their backup team what had happened. Then, they waited in silence, hoping the poachers had not escaped.

After what seemed like an eternity, they heard the voice of one of the officers come through the speaker. The poachers were in custody.

The case resulted in the poachers losing their hunting and fishing licenses for two years. In addition, their guns were confiscated and sold by the sheriff's department and each man was fined $250 and placed on probation for two years. The officers also have memories of a ride they'll never forget — and hope never to repeat.

— Jay Davies

Game Lands Improved

Haywood Tech Helps Wildlife

JAY DAVIES

Willing Hands: *Wildlife management students at Haywood Technical Institute got some "hands-on" experience last spring when they cleared food plots, built brush hides, and pruned fruit trees on the Bent Creek Area of the Pisgah Game Land. These projects will provide additional food and cover for deer, wild turkey, rabbits, songbirds and many other small animals.*

"I'm tickled to death with the work these students did," said Park Peterson, Wildlife Commission Game Land crew leader, who supervised the project with the students' instructor, David Dudek. "It was wonderful working with these kids, and they tripled the amount of work we normally could have accomplished."

Muskie, White Perch, Spotted Bass Fall

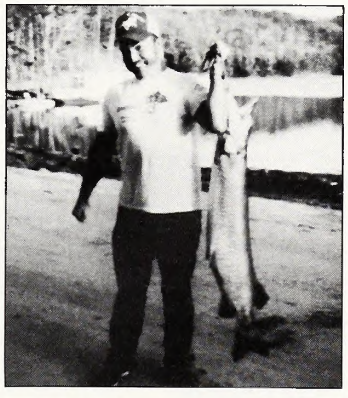
Anglers Have New Records To Beat

Despite high water and cold weather, Tar Heel anglers caught three state record fish this spring — muskie, white perch and spotted bass.

The new state record muskie was caught by Charles Hensley of Candler in Lake Adger. The fish weighed 34 pounds, was 50 inches long, and had a 23-inch girth. It was caught on a plastic worm.

The white perch was caught by Robert Miller of Tatumy, Pennsylvania, in Lake Gaston in late March. This fish weighed 1 pound, 14 ounces and was 14 inches long with an 11¼-inch girth. Miller was using a Speed Shad and a spinning outfit.

Mike Bumgarner of Miller's Creek took the new record spotted bass on a Strike King spinner-bait from W. Kerr Scott Reservoir in Wilkes County in mid-April. The fish weighed 4 pounds, 4 ounces, was 18.2 inches long, and had a girth of 15.1 inches. It replaces a 3-pound, 6-ounce fish taken from the same waters last December.



Record Muskellunge: *Charles Hensley of Candler caught this new state record muskie on a plastic worm in Lake Adger. The fish was 50 inches long, and weighed 34 pounds.*

Big Island Savanna Unique

Conservancy Preserves Outstanding Natural Area

One of the state's finest natural areas has been preserved. Federal Paper Company recently donated 1,872 acres of pine savannas and pocosin forests in Brunswick County to the North Carolina Nature Conservancy.

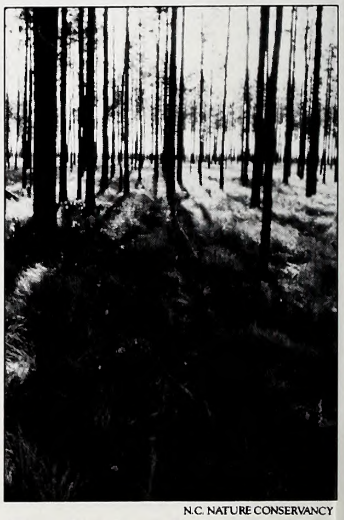
The donation includes the 92-acre Big Island Savanna, and these lands will be added to the Conservancy's Green Swamp Preserve. This preserve was created in 1977 when Federal Paper Company made its first donation of 13,850 acres to the Conservancy. The Big Island Savanna is considered the largest and most ecologically significant pine savanna remaining in the state. Covered with longleaf pine and wiregrass, it is home to seven threatened or endangered plants. These include the insectivorous sweet pitcher plant and the giant-spiraled orchid. Many unusual wildflowers, which bloom from February through December, are also found there.

Big Island Savanna also supports an exceptionally diverse array of plant life. Samples have turned up an average of nearly 40 plant species per square meter. Only a few sites with over 35 species per square meter have been discovered in the western hemisphere, and these are all located on the Mississippi coastal plain. Although no one knows why pine savannas support such a high diversity of plant life, botanists feel that frequent fires play an important role.

"Big Island Savanna is the best example of a mature savanna left in North Carolina, and probably in the country," said Dr. Robert Peet, a professor of ecology at the University of North Carolina. "Unlike many other savannas, however, it has not been badly damaged by commercial logging or undergone long periods without fire. Controlled burning has helped maintain its diversity."

The remaining 1,780 acres are composed of smaller pine savannas and pocosin forests laced with streams. Alligators are found in the waters while the pocosin lands offer habitat for black bears.

The North Carolina Nature Conservancy is a chapter of The Nature Conservancy, an organization which is dedicated to protecting unique natural areas. Since the North Carolina chapter was formed in 1977, 288,000 acres of unique habitats have been preserved in the state through donations and grants from individuals and corporations. For more information contact the N.C. Nature Conservancy, P.O. Box 805, Chapel Hill, NC 27514.



N.C. NATURE CONSERVANCY

Paradise Saved: *Big Island Savanna is one of the state's finest natural areas, and is home to seven endangered or threatened plants. The 92-acre tract was recently donated to the North Carolina Nature Conservancy by Federal Paper Company.*

Smoked Mackerel A Simple Treat

Summer means a trip to the beach for many Tar Heel families. If you happen to catch a few Spanish from a pier during your vacation, here is a simple recipe to try. It was furnished by Mark Bruton, a Commission wildlife enforcement officer from Carthage.

Smoked Spanish Mackerel Filets

Spanish Mackerel filets
corn meal
corn oil

Make a batter with a 1:1 ratio of corn meal to corn oil. Pour batter in large square pan and dip filets in batter. Place battered filets on hot covered grill. Cook 5-7 minutes on each side. Do not overcook.

Sharpen Your Shooting Skills

Practice Pays Off For Hunters

Hunting is the last thing on most sportsmen's minds during the dog days of summer, but it's not too soon to begin practicing for the coming seasons. Now is a good time to sharpen your skills for the coming season. Here are a few tips on practice shooting that may pay off when fall arrives.

— Target shooting from a rest is certainly a good way to improve your marksmanship. However, in the woods a quick, offhand shot is often all you get. To practice, take a full-sized, bow-hunting target of a deer to a shooting range or other safe area. Begin by practice mounting your rifle in one quick, smooth movement. If the deer isn't fully visible in your scope the instant you mount the gun, then the scope is mounted too close or far from your eye. Adjust the scope, and practice mounting the rifle and finding the target until it becomes second nature. Then, begin practicing with live ammunition. Start slowly at first, and work your way up to five shots in a minute. Record the number of hits in a vital area.

— Test your shooting skills with a rifle. Set up an ordinary paper pie plate at 100 yards. Shooting offhand, try to put five shots into the plate in a minute or less. If you can, experts say, you're a far better than average rifleman.

— Practice shooting at targets at different ranges to simulate varied hunting conditions. If you bow-hunt, for example, set up a stand and practice shots from it.

Bow-hunters realize that it's important to practice with the same arrows they use for hunting. However, if you hunt with a rifle, it's a good idea to practice some of your shooting with hunting loads.

Bird hunters should practice the shots they find most difficult at a trap and skeet range. Many hunters, for example, have problems with long, crossing shots. The shots from skeet stations 1-7 simulate these. A new shotgun game called "hunter" or "sporting clays" simulates almost every type of shot found in the field. Information on this game is available from the U.S. Sporting Clays Association, 50 Briar Hollow, Suite 490 East, Houston, Texas 77027.

Some May Be Banned

Marine Paints Harm Shellfish

Legislation was recently introduced into Congress by Rep. Walter Jones of Elizabeth City to halt the sale of marine paints containing tributyltin, a compound harmful to aquatic life.

Paints affected contain additives which prevent the buildup of barnacles and algae on the hulls of ships. This reduces the need for periodic scrapings of the hulls, and also improves fuel efficiency by reducing drag in the water. However, these compounds are very toxic to marine life, and have been linked to shell deformities in oysters and deformities in the reproductive systems of snails and fiddler crabs.

Two types of tributyltin paints are made. "Free-based" paints have the additive mixed into the paint, and it is readily lost to the sea. Copolymer paints are those in which the TBT is chemically bonded to the paint molecules. These paints are more stable, and have a much slower release rate. The legislation would effectively eliminate the sale of free-based TBT paints, and would also outlaw the sale of TBT additives which could be mixed into marine paints before application.

The use of TBT paints is most widespread with commercial vessels. However, environmentalists fear that the paints will grow more popular with recreational boaters. Also, the U.S. Navy recently cancelled a fleet-wide painting program of its vessels with TBT paints after studying the potential effects.

Trout Unlimited Cleans Creeks

Two creeks in western North Carolina are running cleaner thanks to the efforts of the Tuckaseigee Chapter of Trout Unlimited in Cullowhee. Chapter members improved trout habitat by building and installing deflectors and other structures in a section of Kimsey Creek in Macon County and in Cullowhee Creek on the campus of Western Carolina University in Jackson County.

Workers used shovels, axes, log carriers and chain saws to construct the structures, and found the work hard but satisfying.

"It was a lot of work, but it was also a lot of fun," said John Ashe, president of the chapter. "We really improved the trout habitat on these streams. The silt was so bad in Cullowhee Creek that you couldn't see a rock. Now there are rocks all through that stretch of stream."

The chapter was assisted by employees of the Wildlife Commission and the U.S. Forest Service.

Habitat Quality Stressed

Quail Subject Of New Booklet

Sportsmen and landowners who are interested in quail management should be sure to get a copy of *Bobwhite Quail Management — A Habitat Approach* by J. Larry Landers and Brad Mueller. This 40 page, soft-cover book offers detailed information on the life history of quail and developing management plans for quail which incorporate prescribed burning, food plots, enhancement of native vegetation, and other management techniques into standard farming and forestry practices.

The book is a joint effort of the Tall Timbers Research Station in Florida and Quail Unlimited. The authors are national authorities on quail management, and were featured in an article on the decline of bobwhite quail in the December 1985 issue of *Wildlife in North Carolina* magazine.

Copies of the book may be ordered for $5 from Quail Unlimited, P.O. Box 10041, Augusta, Georgia 30903.

JACK DERMID

More To Come: *One of the keys to increasing quail populations is providing good habitat. This is the subject of a new publication available from Quail Unlimited.*

The Wildlife Endowment Fund Report

The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife In North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

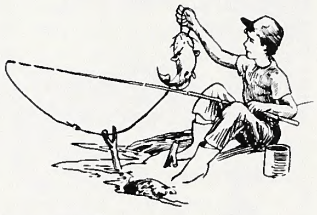
Status on May 31, 1987

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	30,098	$8,930,466.80
Lifetime Hunting License	176	35,880.80
Lifetime Fishing License	1,990	352,976.78
Lifetime Subscriptions to Wildlife in N.C.	1,051	130,017.95
Contributions	—	88,734.43
Fund Total		$9,538,076.76
Total Interest Earned	$1,770,380.29	

Calendar Of Events

August 8
17th annual Shrimp Festival at Sneads Ferry.

August 8-9
Coastal Arts Competition at the North Carolina Aquarium on Roanoke Island in Manteo. Features photography, arts and crafts with a marine theme.

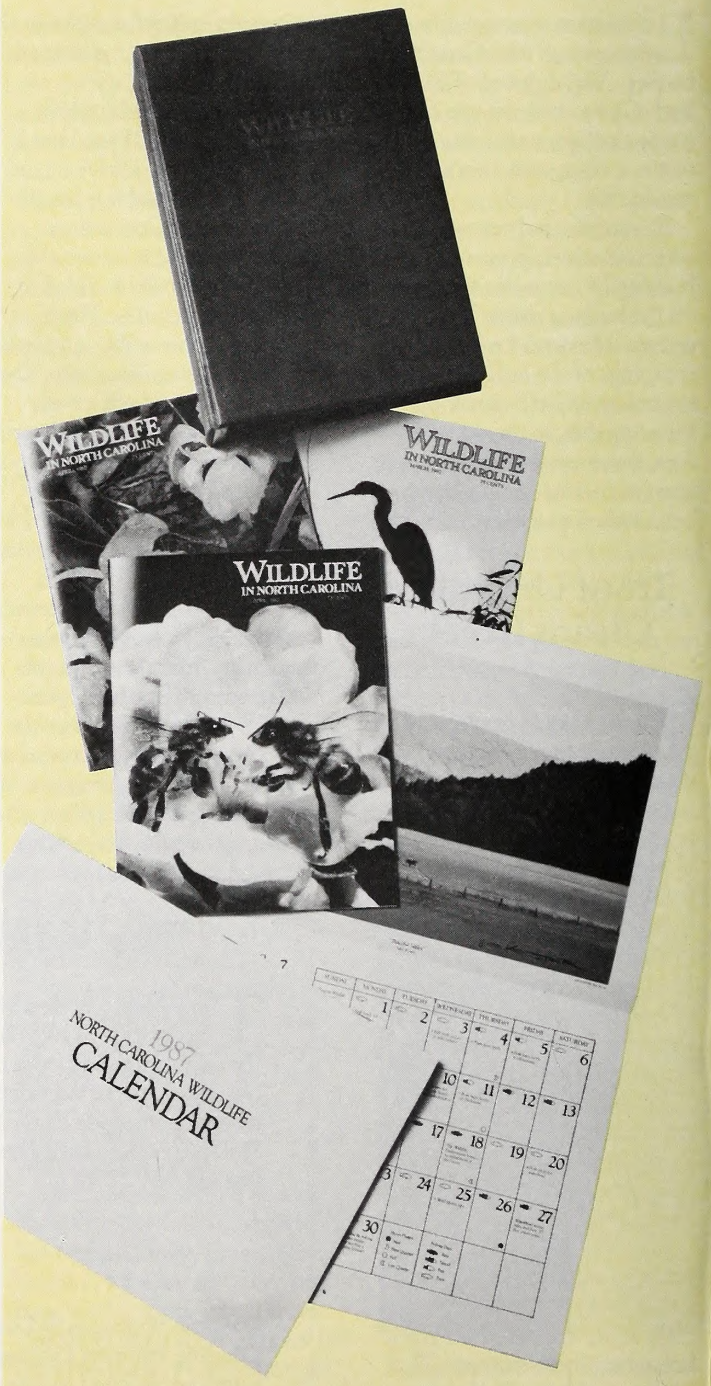


August 13
Second Annual "Take A Kid Fishing Day" sponsored by the Pamlico County 4-H Clubs and the N.C. Wildlife Federation. Special rate for anyone sponsoring a child to fish aboard the Captain Stacy of Morehead City. For more information contact the Pamlico County 4-H Office, P.O. Box 8, Bayboro, N.C. 28515 or call 919-745-4121.

August 15-16
Raleigh Gun and Knife Show at the State Fairgrounds in Raleigh.

August 20
11th annual Strange Seafood Exhibition at the North Carolina Maritime Museum in Beaufort. Education program where over 40 strange seafoods are available to taste. For more information, write the museum at 315 Front St., Beaufort, N.C. 28516.

THE BEST OF ALL OUTDOORS...



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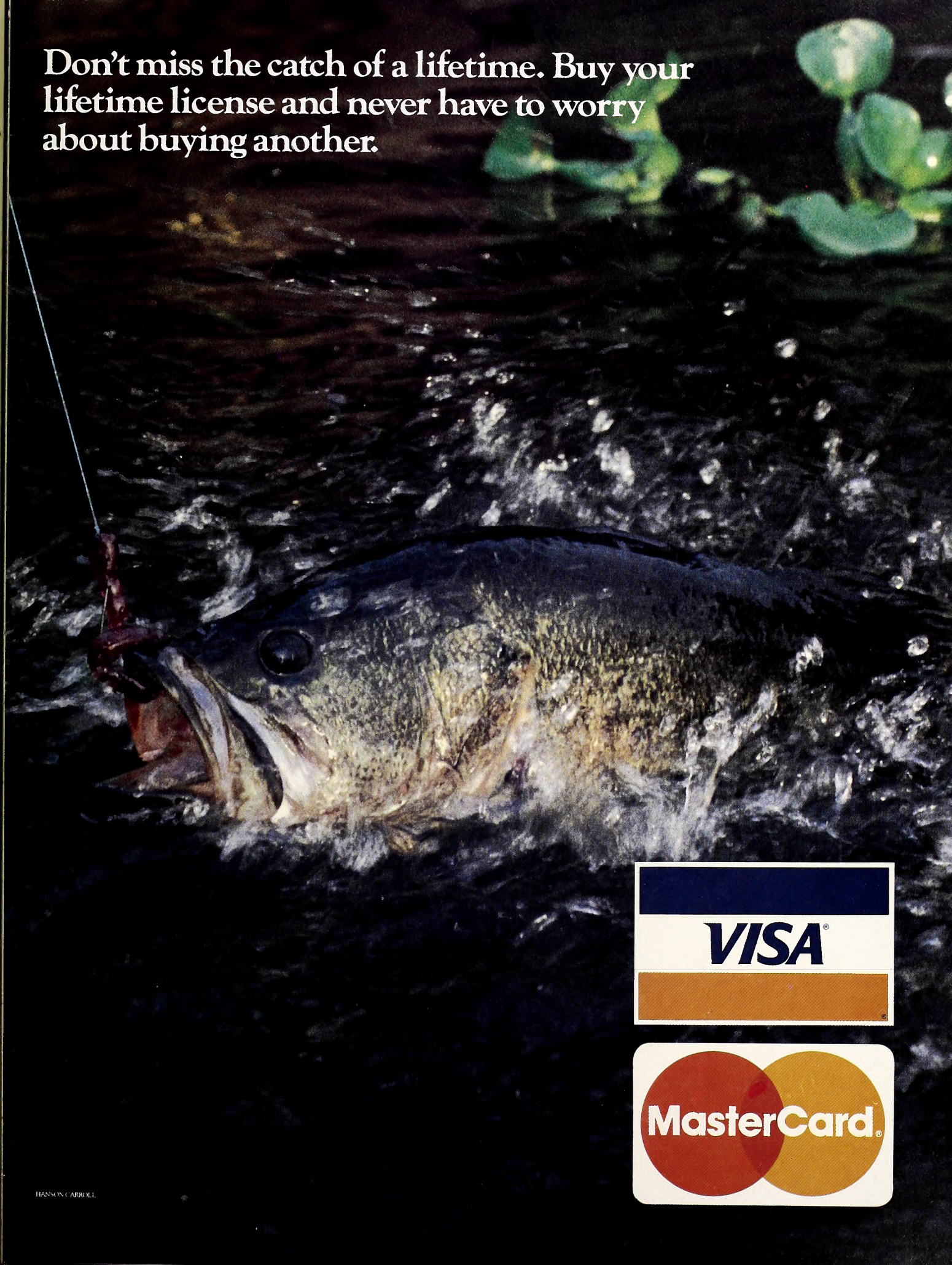
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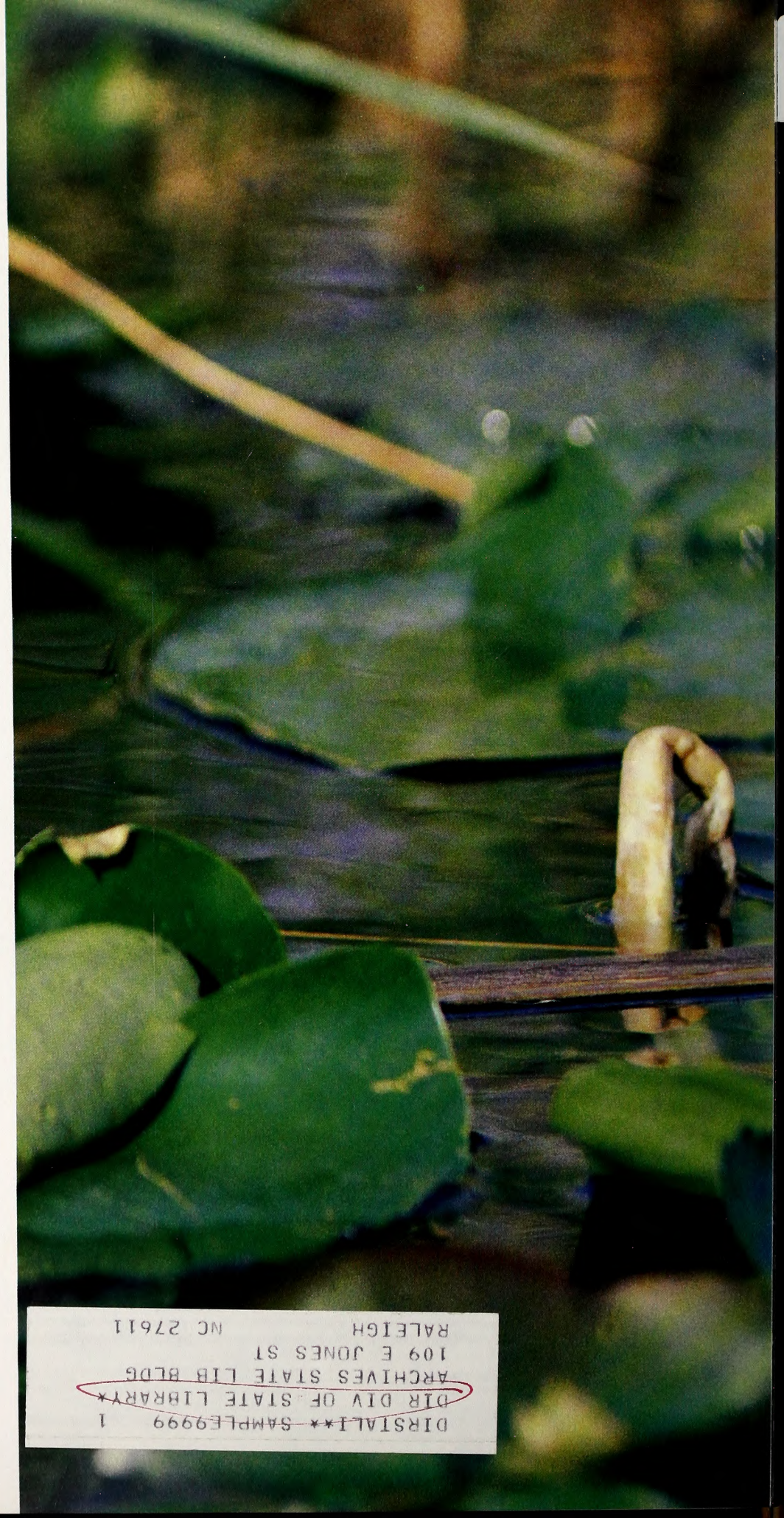

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Wetland Visitor

Frequently mistaken for a small duck, the grebe is a common visitor on North Carolina's ponds, rivers and lakes. When startled, it almost invariably dives.

LITHOGRAPHY BY EDWARDS & BROUGHTON COMPANY, RALEIGH, NORTH CAROLINA

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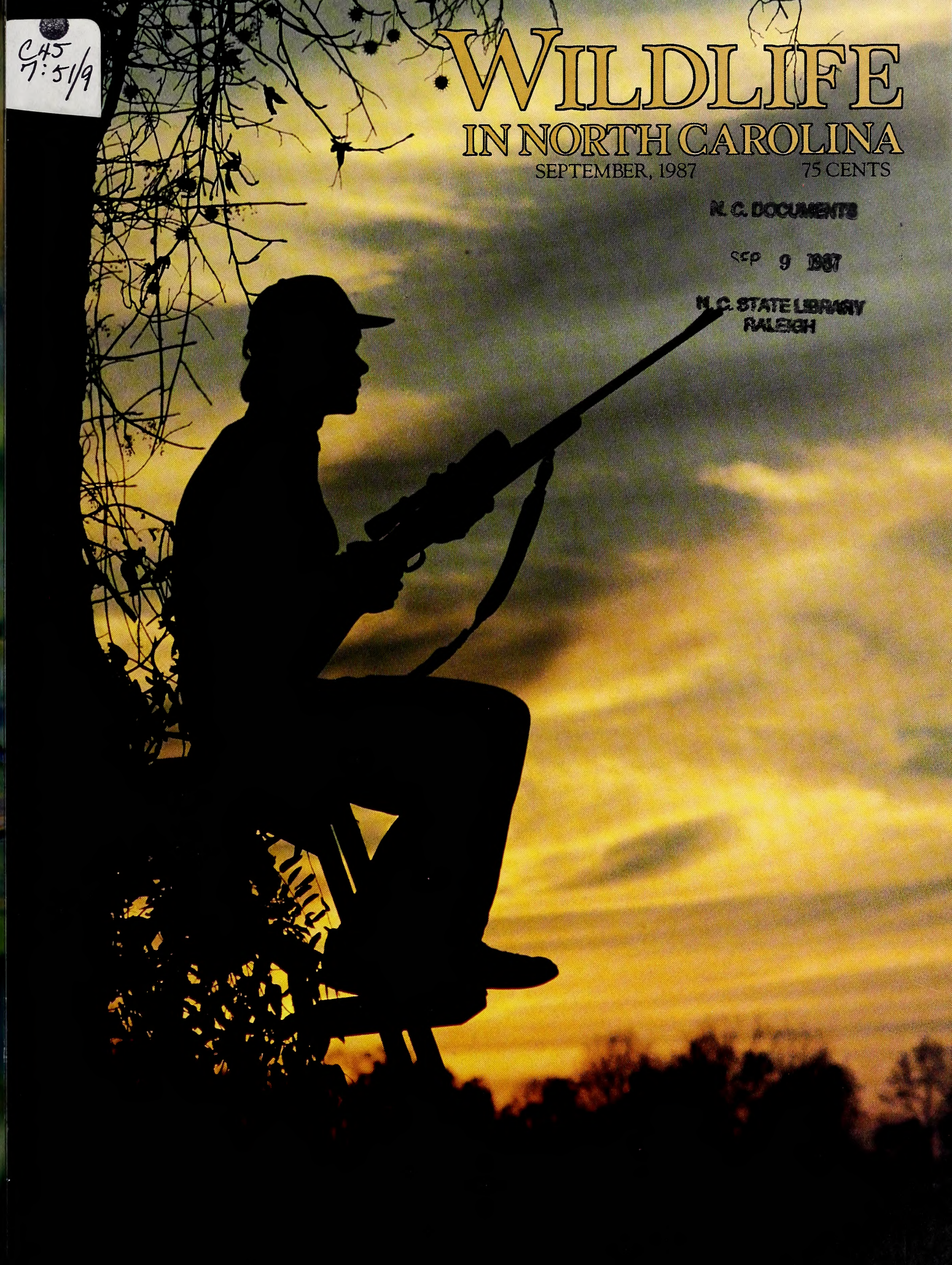

The Art Of Anticipation

by Jim Dean

KEN TAYLOR

For several days last winter until I got around to cleaning them, the rear and side windows of the family vehicle were so badly smeared that they appeared to have been licked. Which they had.

The drool in question belonged to a fine pointer named George — affectionately and accurately nicknamed "The Bonehead" by his owner — and it had been deposited liberally on the windows enroute from Raleigh to Wilmington. Until that trip, I had honestly thought that I was the only soul who mentally hunted fields as I drove through the countryside. Turns out, George also hunts while riding. I've never seen a dog cover so much ground in a back seat, or so much glass with a nose. He even pointed twice at 55 mph; once near Spivey's Corner and again somewhere south of Clinton.

Though George's two-hour stint of snuffling, quivering and rapid rear seat transit tended to be distracting at times, I had no trouble understanding. It's perfectly obvious that the ol' Bonehead is a master of anticipation, and shares that trait with his biped companions. And as is so often the case, anticipation was the better part of George's trip, which is another way of saying that we probably should have checked out his flying points since the actual hunt produced none.

I have observed over the years that anticipation is the better part of a lot of trips, if not the majority of them. Indeed, the wide gap between hope and fulfillment is probably the best argument for our inability to foresee the future. How many hunting and fishing trips would you have scrapped if you'd known in advance how they would turn out?

Most of us have endured a long history of fishless fishing trips and birdless hunting trips, some of which could not possibly have lived up to our expectations. I am especially mindful of the many times my father and I trusted our fortunes to his old pointer, Buck, the original "Pointer Of No Return." Buck won that title the old-fashioned way; he earned it.

Buck had an uncommon instinct, even among his breed, to determine exactly where we were at all times, and studiously avoid us at all costs. We, of course, spent a lot of time hunting, but mostly hunting for Buck. All dogs may go to Heaven, as is commonly believed, but I would be greatly surprised if Dad passed through the Pearly Gates and found Buck locked on a covey. It would be far more characteristic if, on that day, Buck were contentedly prowling through the lowlands along the River Styx. Still, I must admit that we thoroughly enjoyed those hunts up until the very moment we actually began.

Buck, of course, can hardly be blamed for other occasions of unforseen destiny. Had I but known several winters ago what lay ahead of us on a duck hunting trip to the Little Alligator River, I would have immediately cancelled the trip and gladly spent that time reading Milton's "Paradise Lost," an amusement I would not otherwise undertake. The highlight of that trip — is there such a term as "lowlight"? — was the overturning of a brand new truck in a marsh. Close behind was the food poisoning that overtook various members of the party at inopportune moments. No moment, by the way, is more inopportune than when you are dressed in half a dozen layers of goose down and chest waders at dawn in a remote duck blind on a 10-degree morning.

Finally, there was the anticlimatic moment when a duck — the only duck anyone saw in three days — buzzed our decoys. This suicidal gadwall flew unscathed through a barrage on the left side of the blind, then circled widely as if to gather courage and made a run at us from the right where it was promptly missed by the very gunners who were in the act of jeering the lefthand battery. An equal opportunity duck, it flew off leisurely and plopped down just out of range where it dabbled happily for the remainder of the morning.

Despite the misfortunes that befell us on this trip, it probably should be noted that the hunt also provided one other unforgettable moment. As we sat in the blind one morning, a gray stillness fell over the marsh and the dark, ice-fringed water. The decoys sat motionless on perfect reflections, and all the colors around us faded to a luminous silver just as the snow began to fall. We sat in almost total silence hearing only the faint tick of ice crystals striking the grass and the mingled two-note songs of three magnificent swans that passed overhead.

The life of a hunter and fisherman — perhaps all life — is like that. The unpleasant moments are largely unavoidable, but so are the unexpected moments of delight. You cannot plan them, nor would you truly want to. The topwater strike of a largemouth bass; the appearance of a large buck at the edge of the woods; pintails swinging into the decoys — all are enhanced by their unpredictability.

I was told once that as I grew older, it would become more and more difficult for me to convince myself to make the effort to go out. The packing, early mornings, long drives and uncertainties would more easily prevail. "But go anyway," was the advice. "Make the effort if you possibly can. You never know what will happen."

No, but you can look forward to it anyway.

September, 1987
Volume 51, Number 9

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Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Cover *A deer hunter waits patiently in a tree stand at sunset for a whitetail to make an appearance. Photograph by Eugene Hester.*

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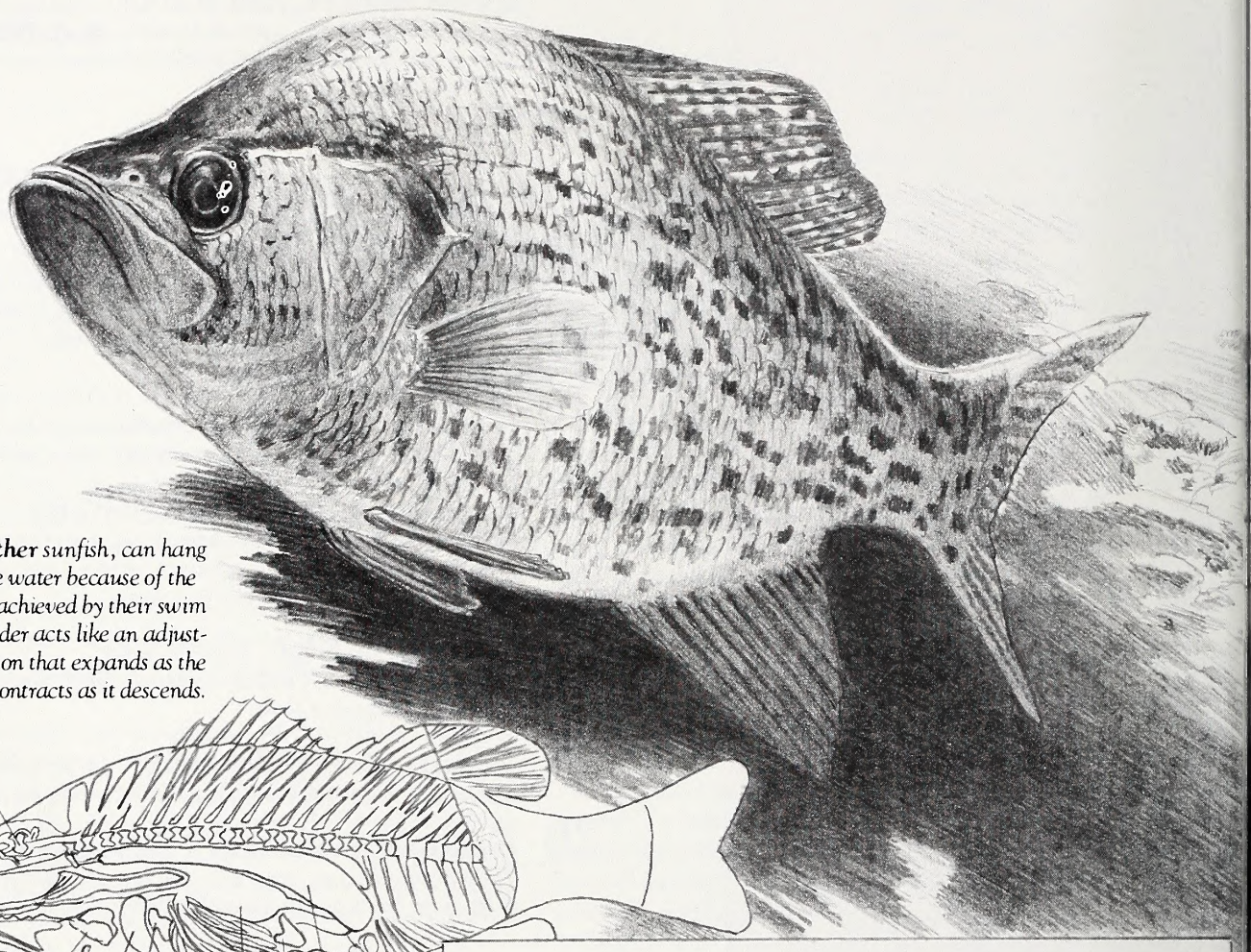
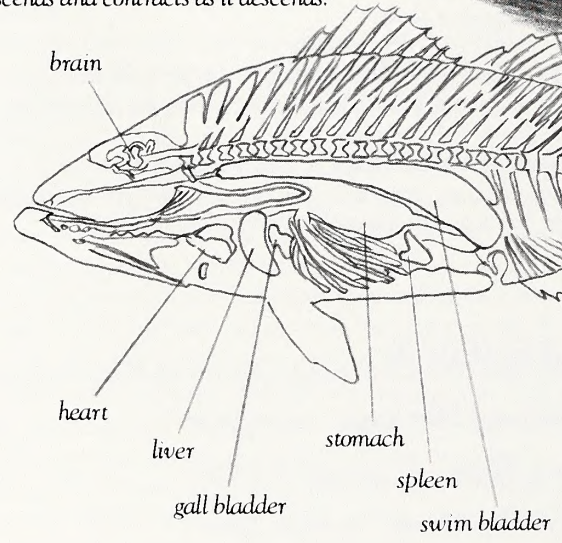
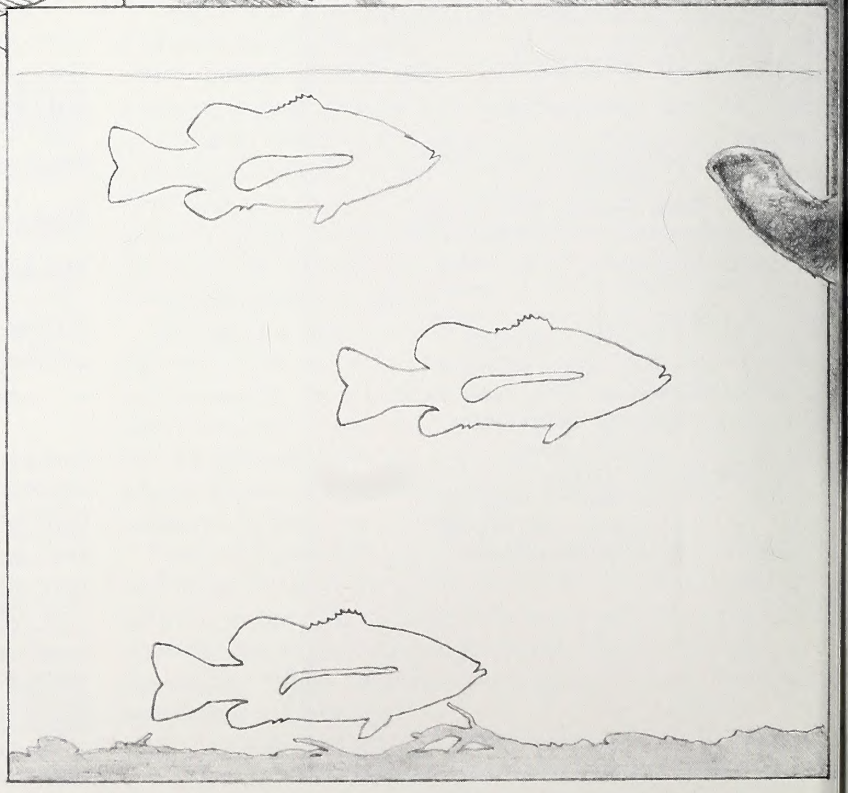


***Crappie, like other** sunfish, can hang motionlessly in the water because of the perfect buoyancy achieved by their swim bladder. This bladder acts like an adjustable float, a balloon that expands as the fish ascends and contracts as it descends.*





***Fish would sink** if they were not buoyant. Like the crappie, a bass is buoyant throughout its range even though it is denser than water. In deeper water, increased pressure squeezes the bladder smaller, making the fish heavier. Near the surface, decreased water pressure allows the bladder to expand, making the fish lighter. At all depths, it is able to hold its position without sinking.*

Staying Afloat

written by Lawrence S. Earley / illustrated by David Williams

Humans have a real problem staying afloat in the water. Since our bodies are denser than water, they tend to sink unless we kick our feet, scull with our arms, or resort to water wings, inflated tubes or other kinds of artificial devices designed to keep us buoyant.

Fish are also denser than water and yet no one has ever seen one wearing a life preserver. Viewed in an aquarium, fish seem to be able to suspend themselves in water with little exertion, barely moving their fins. How do they do it?

The answer is that fish, unlike humans, have a built-in flotation device called a swim bladder. This silvery organ, located in the body cavity above the other organs, acts like a gas-filled balloon. As the fish descends, the water pressure increases, squeezing the gas-filled bladder smaller. As a result, the fish is heavier and thus can suspend itself without effort in the deeper water. In a fish swimming upward, the swim bladder expands due to reduced pressure causing the fish to become lighter. When the buoyancy of the swim bladder balances with the weight of the fish, it is at "neutral buoyancy," or weightlessness. To achieve neutral buoyancy at different depths, fish must regulate the amount of gas in the swim bladder.

Of course, not all fish have swim bladders. For fish like sculpins that live and feed on the bottom the organ is unnecessary because these fish don't need to move up and down in the water. For others that forage more widely, strategies have been developed to keep from sinking. "Primitive" fish like sharks swim continually to keep their position in the water. Their relatives the rays have no gas bladders either, but for these bottom dwellers the deficiency is not a major problem.

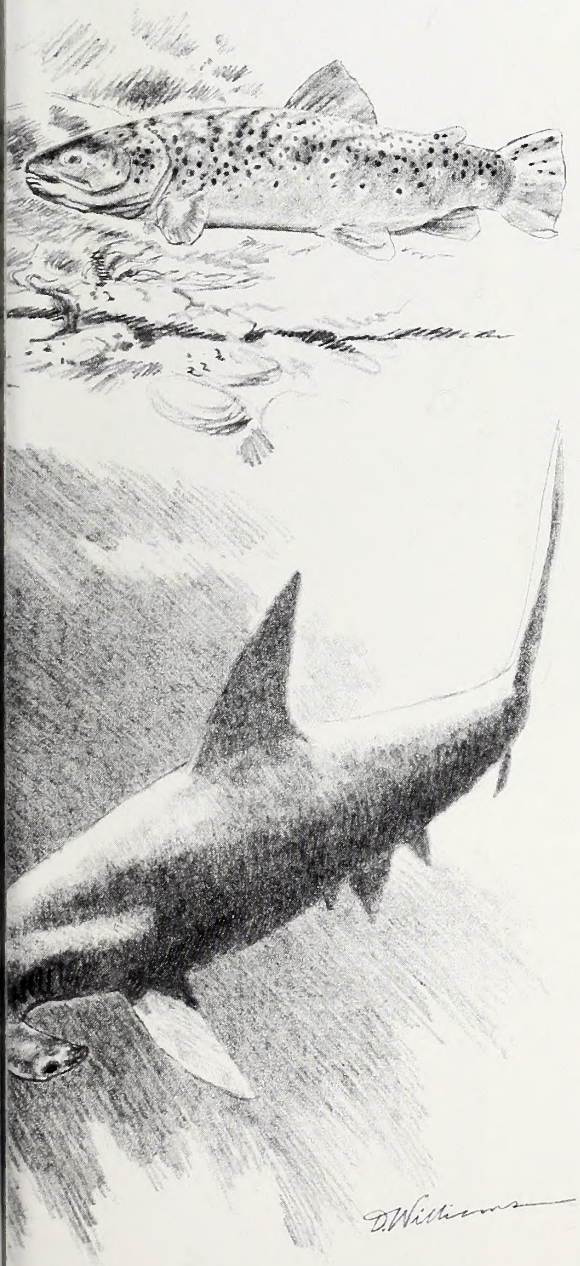
For most evolutionarily "advanced" fish, a swim bladder seems to be standard issue. There are several kinds. The most advanced is the closed swim bladder characteristic of sunfish, bass and others. This type is self-contained. Glands inside the bladder regulate the gas supply by taking it directly from the blood stream and emitting it in a similar way. As a result, these fish can achieve perfect neutral buoyancy.

The least advanced type of bladder is the open swim bladder which is connected to the throat by a wind pipe, an arrangement which scientists believe proves that the swim bladder evolved from primitive lungs. Trout have this type, as do herring, pike, catfish and other fish. Fish having this open swim bladder cannot easily regulate the amount of gas in their bladders. To fill the bladder with air, a trout must come to the surface and gulp air in. To reduce gas in its bladder, the fish must belch it out. As a result, these fish cannot easily achieve neutral buoyancy. Indeed, stream trout "prefer" to be slightly heavy in their swift-moving stream habitats. Weightlessness would handicap these fish.

Because swim bladders expand as the fish rises, there is a limit to the vertical distance a fish can travel in a short time. If a deep-water species is yanked quickly to the surface, the bladder may expand so much that it forces the fish's stomach through its mouth.

Besides providing buoyancy, a swim bladder serves a fish in other ways. It is a hearing device and it produces sound during courtship and while traveling in schools. The swim bladder is truly one of a fish's most extraordinary adaptations to life in water.

***Trout have a** less "advanced" swim bladder than crappie and other sunfish. Trout tend to be slightly heavier than water, an advantage to stream species that live in swift-flowing water. Lake trout species compensate by being more active.*



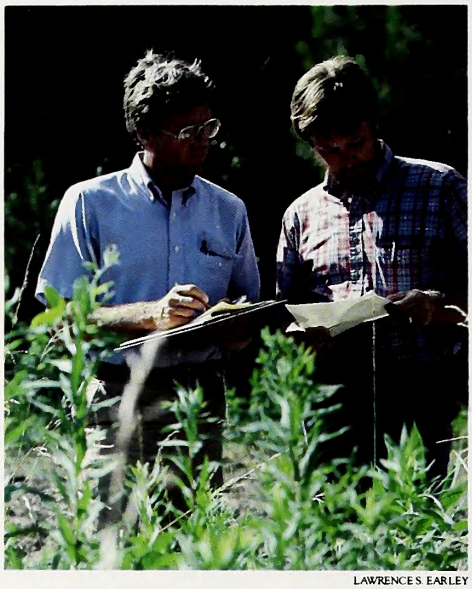
***Sharks and rays** are fish that have no swim bladder. This is considered a "primitive" characteristic. For the rays this is no disadvantage, because they are bottom dwellers and have no need to be buoyant at higher levels. Sharks must swim unceasingly to keep from sinking.*

PROTECTING WETLANDS
PART 3

HOPE FOR OUR WETLANDS

Our priceless wetlands are disappearing rapidly, but new programs such as the "swampbuster" provision of the 1985 Farm Bill and the National Wetlands Inventory are expected to help.

by Lawrence S. Earley



LAWRENCE S. EARLEY

***Stiff penalties** can punish farmers who convert wetlands to cropland under a provision of the 1985 Farm Bill. Above, Soil Conservation Service conservationist Albert Coffee (left) and Steve Riddick of the Farmer's Home Administration identify wetland plants on a Pitt County Farm. Field studies of vegetation help determine wetland boundaries.*

On a small, 69-acre Pitt County farm two figures moved slowly through the loblolly pines fringing cleared fields of corn, soybeans, tobacco, peanuts and wheat. The two bent over patches of vegetation and called out what they saw. "This is giant cane here, Steve," said Albert Coffee, county conservationist with the Soil Conservation Service.

"Here's huckleberry, and there's a bay behind you," said Steve Riddick of the Farmer's Home Administration.

"Sweet bay. That's a wetland plant, and so is that sweet pepper bush all over the ground. The woods are crawling with it."

"What do you call this?"

"Black gum." Coffee rested for a minute and gestured toward the close woods. "Most farmers wouldn't consider this to be a wetland because you don't slosh around in water. But it's got wetland soil and the ground cover here is pretty much wetland vegetation. It looks like I'm going to be identifying it as a wetland."

Across the state and indeed the nation, SCS district conservationists like Coffee are spending more time these days looking at potential wetlands on farms. Wetlands everywhere will be the better for it. Coffee's efforts are a direct result of the Food Security Act of 1985, more familiarly known as the 1985 Farm Bill. Although the bill was endowed with several conservation measures, wetlands protection was given a major boost in the so-called "swampbuster" provision of this bill. Under this provision, a farmer who converts wetland to cropland loses all U.S. Department of Agriculture crop supports.

In the treasure chest of natural habitats in North Carolina, wetlands are among the state's most valuable areas, providing food and cover for fish and wildlife, and providing important services to humans. Yet over the years they have been exploited piecemeal, drained or filled for home, for farm, for shopping center. Even wetland laws flex only a

U.S. FISH & WILDLIFE SERVICE

flabby muscle in protecting wetlands. That is why the "swampbuster" provision of the Farm Bill is one of several recent innovative programs that excite conservationists, for they promise tougher protection for wetlands especially where it is needed most — in the freshwater areas away from the coast.

Under the "swampbuster" provision, a farmer who wishes to put land into production that has not been farmed since 1981, or who wishes to convert new land to cropland, will have to prove that the land is not a wetland. SCS district conservationists like Coffee will consult soil maps first to see if the proposed conversion occurs on a wetland soil. If it does, the conservationist may make a site visit to identify the vegetation on the area to be farmed. If it's wetland vegetation, the conversion plan will be called swampbusting and the farmer will be advised that he will lose his government benefits if he goes ahead with it.

The supports affected by the "swampbuster" provision constitute the heart and soul of the agricultural subsidy programs for farmers — price and income supports, crop insurance, Farmers Home Administration loans, payments for grain storage, Conservation Reserve Program payments and other commodity-related payments. Eighty percent of farmers nationwide participate in these programs. Not only are these supports denied for the wetlands converted to cropland, but for all the land owned by the farmer.

It's a tough bill, and it was designed to carry some weight. During the 1970s, agricultural conversions of wetlands accounted for nearly 90 percent of the 458,000 wetland acres drained each year, according to the U.S. Fish and Wildlife Service. The booming farm economy of those years has subsided today, but the "swampbuster" and its sister, the "sodbuster" provision which denies the same payments to farmers who convert erodible land, may ensure that such losses are not suffered again.

This legislation corrects a long-standing contradiction in federal policy. For many years while some federal programs attempted to discourage wetland conversions, others — notably farm supports and tax codes — allowed farmers to write-off wetland conversions and encouraged them to put as much land into production as possible.

"I think it's a good law," says Albert Coffee. "There's no purpose served by opening up more cropland to crop production.... With commodity prices down, reducing the acreage in crops will eventually have a positive impact on commodity prices. And it's got a lot of environmental pluses."

Charles Hollis, chief of the regulatory branch of the U.S. Corps of Engineers in Wilmington, salutes the provision for another reason. Before this law, farmers were exempt from the wetland-protection provisions of Section 404 of the Clean Water Act. "A farmer could do just about anything he wanted without having 404 bother him," he says. "Now he's no longer exempt and the wetlands issue is on his head. Congress has sent a good signal."

Another federal program with great potential for determining the extent of wetlands (and wetland losses) is the National Wetlands Inventory. Launched by the U.S. Fish and Wildlife Service in 1975, the inventory is designed to classify and map the nation's wetlands and deepwater habitats.

The raw materials of the inventory are large color-infrared photographs shot from 40,000 feet. The transparencies render true contrasts between land and water, and the shades of color reflect differences in vegetation and even stages of growth. The photos are taken in winter so that deciduous vegetation can be distinguished from evergreens. Green leaves or needles will appear as a shade of red or brown, while deciduous trees will look blueish, gray or green.

Scanned through a stereoscope, a pair of these transparencies produces a three-dimensional image of startling detail. Despite the high altitude from which the photographs are shot, a shrub can be distinguished from a tree. Using these photographs and also making field investigations, botanists draw the wetlands on a film overlay and classify them according to a nationwide wetland classification system. This information is eventually transferred to maps drawn to a 1:24,000 scale with boundaries the same as a 7½ minute U.S. Geological Survey topographic map.

For many years while some federal programs attempted to discourage wetland conversions, others allowed farmers to write off wetland conversions.

Wetland maps with this degree of accuracy can be invaluable to anyone who needs to know where wetlands are — from developers to city planners. With such a map a developer might be encouraged to build on a nonwetland site to avoid the delays associated with Section 404 permits. Or he might choose to build on the upland portion of his site, away from the wetlands. For city or county planners, wetland maps are equally valuable.

Yet though the demand for these maps is growing, so far the maps themselves have not been as readily available as officials would like.

"We've had one request for maps from Beaufort County which is updating its county-wide land-use plans," says Steve Leonard, environmental specialist formerly with the Division of Soil and Water Conservation, the lead state agency in the wetlands-inventory program. "They told us that if they had the wetlands maps they could incorporate them into their planning. Unfortunately, Beaufort is not completely mapped at this time."

Few counties are. Of the state's 955 maps, only 213 had been completed as of June 1987, 174 of them in the Coastal Plain. The latter figure represents only 40 percent of the mapping needed in the Coastal Plain, which the Fish and Wildlife Service has named as its highest priority mapping area in the Southeast. "North Carolina is the only state on the Atlantic Seaboard that has not completed or slated completion of its mapping by the end of this fiscal year," says Mike Gantt, Fish and Wildlife Service field supervisor in Raleigh.

Though mapping is behind schedule in the state, the National Wetlands Inventory

Skilled technicians *can use infrared photographs like this one to map wetlands. This view from 40,000 feet shows the Tar River (flowing from left to right) and the Pitt County community of Grimesland (left of center). With infrared photography, water and swamps show up as the darker tones of* ***blue****, pine trees appear* ***brownish****, and the* ***bright red*** *patches are fields of small grain. In the river corridor, note the mosaic of* ***blue*** *(cypress-tupelo swamps) and* ***bluish-brown*** *(mixed pine-hardwood ridges). Topography such as this is superb habitat for deer, wild turkey, and other bottomland species. The small circular spots adjacent to the river channel are vegetated dredged material deposits or "spoil islands." An area of flooded sand gravel pits is indicated by the* ***dark blue*** *rectangles slightly to the right of center. Chicod Creek is almost* ***black*** *where it snakes its way across the Tar River swamp, just northwest of Grimesland. On the opposite side of the river is the channelized Hunting Run Creek. Even in the whitest plowed fields, moist spots appear as streaks of* ***blue****.*

Too often, city and county planners are unsympathetic with the plight of wetlands and they communicate their attitudes to developers and others.

will one day be used from the mountains to the sea to identify wetlands. It's one of the best planning tools we have.

A recent state project has also pleased wildlife officials because it has already helped offset the loss of wetlands. Under an agreement among the Wildlife Resources Commission, the N.C. Nature Conservancy and the Department of Transportation, DOT appropriated $500,000 toward the purchase of Company Swamp, 1,436 acres of prime bottomland hardwoods in the mouth of the Roanoke River. This swamp was one of four Roanoke tracts totalling 5,360 acres purchased by the Wildlife Commission. The portion of Company Swamp purchased by DOT's funds will function as the "mitigation bank," one of three in the Southeast and 13 in the nation.

The term "mitigation" refers to a five-step process during the Section 404 permit review. When a development project in a wetland is judged in the public interest but will produce an "unavoidable impact" on the wetland, mitigation occurs. That is, attempts are made to (1) avoid the impact, (2) minimize it where it is unavoidable, (3) rectify the impact by restoring or repairing the wetland, (4) reduce the impact over time, and (5) compensate for the impact by providing substitute wetlands. The mitigation bank deals with compensation.

"We were finding that when the N.C. Department of Transportation was planning a particular highway, we might get them to reduce the impact in a wetland from 40 acres, let's say, to 20," says Mike Gantt. "But then you're down to an 'unavoidable impact.' But it wasn't just one highway project. Two years ago we looked at all of those 'unavoidable impacts' over the course of one year and it came out to 198 acres. And the bulk of them were bottomland hardwoods.

"Which is why we went to DOT and said why don't we do something like a mitigation bank."

In most circumstances where a developer has had to compensate for wetland losses he did so by either purchasing a piece of wetlands equal to the amount affected by his project, or in some cases by constructing a new wetland. Neither was satisfactory, says Gantt.

"Let's say they give us 20 acres to compensate for the 20 they are going to destroy. Who wants it? It's not big enough to manage." Moreover, the technology of creating new wetlands — especially freshwater forested wetlands — has not been successful. "Recent studies indicate that even man-made coastal marshes may not be as productive as natural marshes," says Gantt.

A mitigation bank, as the name implies, is an account containing a valuable commodity, in this case wetlands. Instead of purchasing six acres of wetlands here, and 10 acres there, DOT helped to buy the 1,456-acre Company Swamp, one of the best tracts of bottomlands in the Southeast. The agency's unavoidable impacts in wetlands are now "withdrawn" from this account in a similar way that a bill is paid with money taken from a bank account.

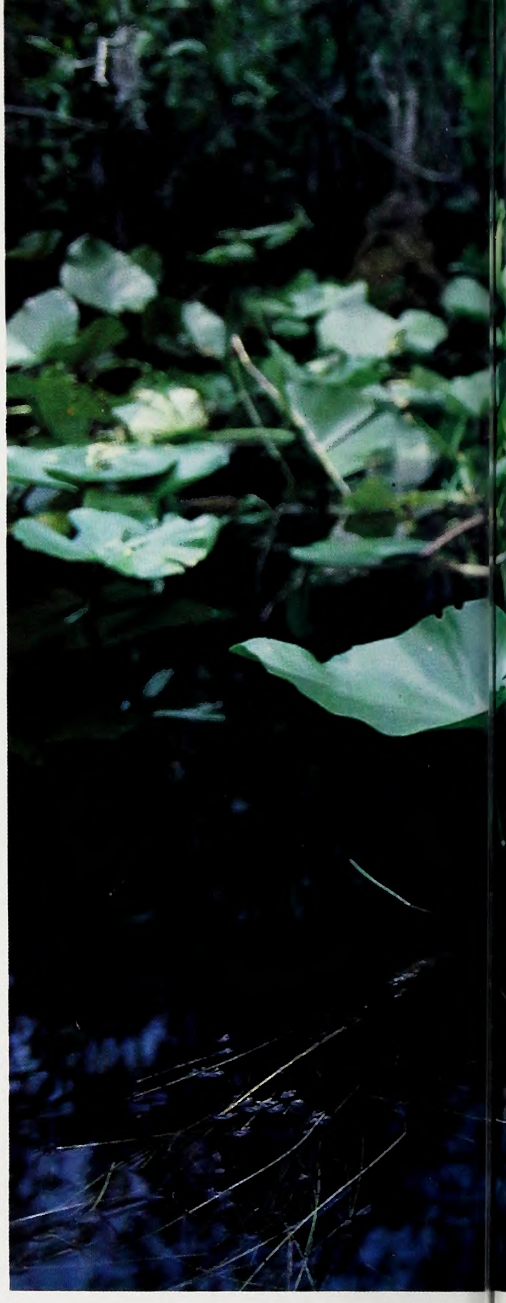
Gantt explains that debits to the mitigation bank are calculated not on an acre-by-acre basis, but by a system that estimates the value of the affected habitat for fish and wildlife. "If we lose two acres of very valuable habitat, they need to give us six or eight to compensate," Gantt says. "If it's two acres of not very good habitat, they may need to give us only a quarter of an acre."

The mitigation bank is limited—it applies only to DOT's projects in bottomland hardwoods, and it is by no means a cure for continuing statewide wetland losses. Indeed, it may even contribute to wetland losses by suggesting to DOT engineers that they have advance authorization for wetland-destroying projects. Conservationists maintain that avoiding projects that destroy wetlands is still the best answer for wetland preservation.

These are some of the new programs that are addressing the needs of wetlands, especially freshwater wetlands. And yet much more remains to be done before wetlands have the status and the protection they require.

Ideally, say state and local officials, all levels of government would be involved in this protection effort. Federal laws would be improved. The state would support wetlands with its own statutes and even local governments would identify and protect important wetlands in their districts. A massive education program would inform the public of the value of wetlands and the reasons for protecting them.

Some of the pieces of this ideal program are in place, but crucial parts are missing.



***Swamps, bogs and** other freshwater wetlands perform important services, but few realize how important they are. More education is the key.*

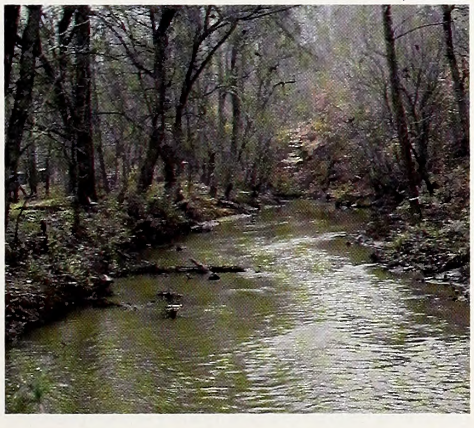
• **Education**. The construction of a roadway through a beaver pond is halted when a Corp of Engineers biologist notices that the project has not secured a 404 permit. The culprit? Perhaps a private developer who didn't know the law. Surprisingly it is often a city or county government unaware that filling in a wetland without a permit violates federal law.

Many believe that more public education about wetlands is badly needed. Too often, city and county planners are unsympathetic with the plight of wetlands and they communicate their attitudes to developers and other citizens. Those who know how important wetlands are somehow don't get the

EUGENE HESTER

U.S. FISH & WILDLIFE SERVICE

JOE MICKEY



Recent cooperation *between state and federal agencies is a hopeful sign for wetland protection. At left, Duplin County's Limestone Creek shows the scars of a 1983 Soil Conservation Service project that eliminated beneficial vegetation and stream obstructions. At right, Dutchman's Creek in Davie County shows no ill effects after a similar project in 1985. Here SCS conferred with biologists from the Wildlife Resources Commission and the U.S. Fish and Wildlife Service. Only major obstructions were removed, and bank vegetation was left untouched.*

message out.

"Our counties and local governments need to be aware that wetlands serve some public-interest purposes," says Charles Hollis of the Corps of Engineers. "They're not just an old hole out there that needs to be filled in. The coastal counties have heard the message longer because of the Coastal Area Management Act (CAMA), and they've accepted it pretty well."

Away from the coast, however, few are aware that bottomland hardwoods, bogs, and freshwater marshes play important roles for fish and wildlife, for improving water quality and for flood control.

Russ Lea, associate professor in the Department of Forestry at N.C. State, says that over the years, TV programs and magazine articles have raised citizens' awareness of the value of salt marshes and the laws governing their use. "If anyone tries an activity in a salt marsh they know they'll have hell to pay,"

LARRY DITTO

***Pintails flare for** a landing in a North Carolina slough. Fish and wildlife are jeopardized by development that fragments wetlands.*

Lea says. "That mindset is not the same for bottomland hardwoods. We need to get across the concept that wetlands such as bottomlands are good."

While many agree with the need for public education, there's less agreement over who would be doing the educating. Several would put the burden on the Corps of Engineers, since that federal agency is responsible for the 404 permit program. "I have asked the Corps, why haven't you been doing any sort of education or public information," says John Parker, state 404 coordinator with the Division of Coastal Management. "We need TV spots."

But Hollis says the Corps is doing as much as it can. "We don't turn down any opportunity to talk," he says. "I must give public presentations twice a week, year round." With only six field biologists, the Corps suffers from a manpower shortage.

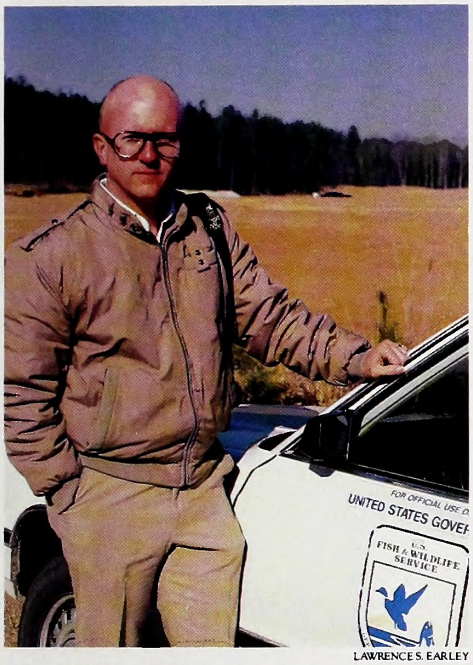
The problem remains, and it is a troubling one. Understanding wetland values and wetland laws might not solve everything, but for local officials and citizens it remains an essential first step toward enlightened planning policies.

• **Greenways.** Many officials believe that local governments ought to be doing more to identify and protect their own wetlands than they are doing. "There's not enough attention given to long-range planning in metropolitan areas, particularly with regard to wetlands," says Mike Gantt.

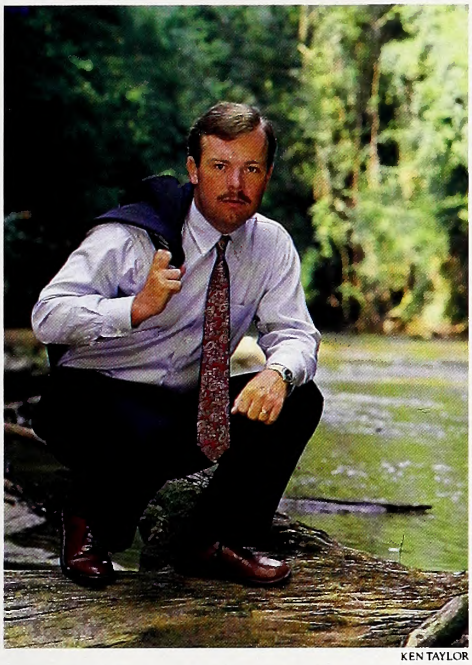
One long-range plan that many cities and towns are using to help protect wetlands is a greenway plan. Greenways are linear parks, parks that are not scattered areas but connected, usually along creek or river systems. A greenway can maintain open space, provide flood control, protect wildlife habitat and offer recreational opportunities for urban areas.

Because wetlands occur along rivers and streams, greenway plans are also an effective way of protecting some wetlands. "Many wetlands are located in the floodplain," says Bob Mosher, Raleigh city planner. "And if the city has strong floodway ordinances, there's less chance of the wetland being filled in."

Some local areas have developed major acquisition programs to put together its greenway system. Mecklenburg County, for example, recently passed a $4.5 million bond to acquire greenway lands. Raleigh's Capitol Area Greenway System has chosen another way — it makes its acquisition part of the development process. "If a developer wants to develop land adjacent to the flood-



LAWRENCE S. EARLEY


KEN TAYLOR

***Many observers favor** legal remedies for the ills suffered by wetlands. U.S. Fish and Wildlife biologist Wilson Laney (left) believes that state laws protecting freshwater wetlands should be enacted. To environmental lawyer Derb Carter (right), watershed management is a key to wetland protection.*

plain, he is asked to reserve some land for the greenway," says Mosher. "Along the Neuse River the city asks for a dedication of 150 feet; along Crabtree Creek 100 feet, and along smaller tributaries up to 50 feet. As a result of our floodway regulations, much of our greenway is donated."

Greenways are an effective and popular way for cities and counties to build an urban park system, prevent flooding and protect wetlands.

• **More Effective Laws.** In the Coastal Plain, one developer dumps a truckload of dirt onto a pocosin wetland. Another clears the vegetation from his pocosin, drains and removes the soil. In the first case, the developer has broken the law and could be made to restore the pocosin; in the second no law has been broken. In both cases, however, the wetland is destroyed.

This loophole in Section 404 of the Clean Water Act has long outraged conservationists and regulators, and is frequently cited by state and federal officials when assessing the limitations of current wetland protection. Yet eliminating this loophole, some believe, would have minor effects on the protection afforded by current laws and regulations. To provide better protection, stronger laws are necessary.

One area of concern is the lack of protection afforded freshwater wetlands in North Carolina. In the coastal zone, CAMA, a state law, and Section 404, a federal law, combine to protect salt marshes effectively, but CAMA only covers the marshes in the 20 coastal counties and 404 protection is spotty at best in the rest of the state. No state law protects inland freshwater wetlands.

Nine states have passed laws protecting inland wetlands, the latest being New Jersey whose legislation requires developments to leave 75- to 150-foot buffers around "Exceptional or pristine" wetlands and smaller buffers around "Intermediate" wetlands. Florida has one of the strongest wetland statutes of any state, says Lawrence Jahn, president of the Wildlife Management Institute in Washington, D.C. "In effect it says there can't be any more losses of wetlands without creating new ones. Florida says we must maintain the wetlands we have, and if we can't then you've got to construct new ones."

Local regulations might also go a long way to strengthen wetland protection. "Local regulations addressing the importance of wetlands are the key in our opinion," says Charles Hollis of the Corps of Engineers. "There are so many loopholes in Section 404, and we've got such a short staff there's just no way we can handle the needs of all 100 counties."

Other observers see the need for legal improvements in other areas. The major shortcoming of current laws, says environmental lawyer Derb Carter, is that "you tend to deal with things on a permit-by-permit basis and lose grip of the whole picture." About 95 percent of all permit applications are approved, and this makes the law a permitting procedure rather than a protection measure. In

"We really need a wetlands-protection program that says you cannot fill a wetland unless you can really justify the reason."
— Wilson Laney

the Piedmont and mountains, bottomland hardwoods along rivers and streams are gradually destroyed by small projects that are reviewed on an individual basis.

"Ultimately what I think needs to be done," says Carter, "and where things are moving slowly is the approach that would look at the entire watershed. Somehow the permitting process has to be integrated in a larger management scheme."

Current laws also fail to take into consideration the cumulative impacts on wetlands. "At what point do we decide that we have lost enough wetlands?" asks Wilson Laney, Fish and Wildlife Service biologist. "We really need a wetlands-protection program that says you cannot fill a wetland unless you can really justify the reason."

Russ Lea agrees. "The burden of proof ought to be on the developer to show me why he's not going to screw up the system," he says.

Another problem with current laws is a legalistic preoccupation with the letter of the law rather than the spirit behind the law. A 250-acre development placed right up to the edge of a marsh may win approval of a 404 permit, but it may well destroy the natural functioning of the wetland, especially for wildlife. "We might protect a little Piedmont wetland so that it provides quality water purification and aesthetics," says John Parker. "But if I build on three sides of it and put three roads down the middle, then I've fragmented that wetland to the extent that the remaining wildlife is the blue jay and the wharf rat."

Wetlands aren't wastelands. That's a message that wildlife managers have trumpeted for more than half a century, and yet it still remains a difficult concept for many. Without better protection, wetlands will continue to be lost, if not in massive land-draining projects as happened in the '50s, '60s, and '70s, then by bleeding to death in three- or seven-acre units. Either way wetlands are destroyed — it's just a matter of time. ⊠

***Benjamin Franklin** argued that the wild turkey would make a more appropriate national symbol than the bald eagle, and in his day there may have been 10 million turkeys roaming the nation. By 1900, they had been virtually wiped out and remained endangered until restoration projects funded by Pittman-Robertson helped bring them back.*

What's P-R To You?

For 50 years, a little-known piece of legislation has been largely responsible for protecting and restoring this nation's wildlife.

photography by
Leonard Lee Rue, III

Ask the average man or woman on the street to describe the status of wildlife populations in this country today, and you'll get an amazing variety of mostly misinformed answers. Among them will be a surprisingly large group that believes most wildlife species are in danger of extinction.

Most would be astonished to learn that they are wrong, and absolutely amazed to learn that the future of many species is far brighter today than it was in the "good ol' days" around 1900.

Yet, the fact is that things looked bleak for many species of wildlife in North Carolina not only at the turn of the century, but for many years thereafter. There were very few whitetailed deer. The wild turkey was nearly gone, wood duck populations were low, and many other species were in trouble. Nor was the problem simply uncontrolled hunting because many nongame species were also in serious decline.

Nationwide, the situation was perhaps even worse. You could add pronghorn antelope and bighorn sheep to the growing list of large animals in trouble.

To give some idea of the scope of the problem, there were only an estimated 300,000 to 500,000 white-tailed deer left in the entire United States in 1900. There may be that many whitetails in North Carolina in 1987. Not only that, the wood duck is the most numerous duck in the state today, and the wild turkey is making a rapid comeback. Elsewhere, the story is much the same.

How so? How can that be when there are so many reports of endangered wildlife species? The answer is that those species which are currently threatened or endangered consist almost entirely of nongame species that are losing their homes to rapid development or other similar factors. No species is endangered which has been traditionally hunted for sport, and there is renewed hope for some of the endangered species — whooping cranes and red cockaded woodpeckers, for example.

One of the main reasons for this remarkable rebound in our nation's wildlife can be traced to a relatively unknown piece of legislation signed into law by President Franklin D. Roosevelt on September 2, 1937. This year marks the 50th anniversary of this law.

Two men — Senator Key Pittman of Nevada and Congressman A. Willis Robertson of Virginia — deserve much of the credit for the enactment of The Federal Aid in Wildlife Restoration Act which has become known as the Pittman-Robertson or "P-R" Act. But Pittman and Robertson were merely the spearheads for concerned sportsmen. Alarmed by the decline of game species, hunters organized and lobbied for effective conservation measures, and they were willing to put their money behind their convictions.

The P-R program provides grants to states for wildlife restoration and hunter safety education through an 11 percent Federal excise tax on sporting firearms and ammunition and archery equipment, and a 10 percent excise tax on handguns. Originally, the law provided for a 10 percent excise tax on sport-

One of *North America's premiere big game animals, the elk, was clinging to a precarious existence on vastly reduced range until restoration projects funded by Pittman-Robertson began to take effect after 1937. The elk is again abundant in many parts of its original western range.*

Beavers disappeared *from North Carolina and most other parts of their original range by the turn of the century, but their populations have rebounded so well that beavers are considered a nuisance in some areas. More than $1.5 billion in federal aid generated by excise taxes on sporting firearms and ammunition, plus an additional $500 million in matching state funds, have helped pay for nationwide wildlife-restoration projects.*

Waterfowl species *such as these Canada geese have benefitted from the funds generated by Pittman-Robertson excise taxes. Many citizens are not aware that these taxes even exist, or that the legislation that established them as part of the 1937 Federal Aid in Wildlife Restoration Act (P-R) originated at the urging of sport hunters.*

***Before the pilgrims** landed, the white-tailed deer population in what was to become the United States was estimated at 24 to 34 million deer. By 1900, that number had dropped to less than half a million. Today, the whitetail population has been restored to 14 million with their numbers still increasing. The Pittman-Robertson Act passed into law in 1937 at the urging of sport hunters is a major reason for this remarkable success story.*

ing arms and ammunition only, but this was raised to 11 percent in 1941. A 10 percent excise tax on pistols and revolvers was added in 1970, and an 11 percent excise tax on bows and arrows in 1972.

The U.S. Fish and Wildlife Service distributes the funds from these taxes to states apportioned on the basis of the number of licensed hunters and the size of the state. Each state decides which projects they wish to propose for P-R funds, and these must be approved by the U.S. Fish and Wildlife Service before they are funded.

Over the past 50 years as a direct result of this little-known program, hunters have funneled over $1.5 billion into wildlife restoration.

Largely because of hunters' taxes and fees, white-tailed deer have increased from less than half a million in 1900 to more than 14 million today. The 1907 count of 41,000 elk south of Canada has burgeoned to half a million. The wild turkey can be found in 43 states, and the pronghorn antelope, desert bighorn sheep, black bear, beaver, Canada goose, mountain lion and wood duck are surviving with no fear of extinction. These and other wildlife species, ranging from the stately caribou to the kangaroo rat, have survived and the P-R is the main reason.

The mid-1930s were an inauspicious time for any proposal to aid wild animals. The Depression following the stock market crash of 1929 left at least one non-farm worker in every eight unemployed, and 34 million men, women, and children with no income whatever.

Then, to top off the economic disaster, the first of the Dust Bowl storms hit the Great Plains in November, 1933. Following a combination of over-plowing and drought, high winds carried great clouds of soil across the continent and into the Atlantic Ocean and Gulf of Mexico. The drought ruined tens of thousands of farm families.

Against this unpromising backdrop, Jay N. "Ding" Darling, a nationally syndicated cartoonist for the *Des Moines Register* and director of the Bureau of Biological Survey (forerunner of today's U.S. Fish and Wildlife Service) convened the first North American Wildlife and Natural Resources Conference in 1936. An ardent conservationist, Darling advocated a "wildlife policy" that would declare the survival of game animals and birds to be in the national interest, and would place federal and state efforts on a scientific basis. While many Americans now take for granted the idea of scientific wildlife management, it was a brand new notion in 1933 when conservation pioneer Aldo Leopold published his major work on the topic, *Game Management*. The idea that wildlife species could be aided through scientific management principles gained swift acceptance in the late 1930s. Ding Darling made an important first step in advancing this idea when he convinced executives from the Du Pont, Hercules, and Remington Arms companies to help fund a program of cooperative research units, located at land-grant universities. The units would provide graduate-level training for wildlife scientists and conduct much-needed research on wildlife.

By the end of 1938, 43 of the 48 states had passed laws reserving hunting license fees for wildlife management purposes, thus qualifying them to receive P-R funds. And in June 1938, Utah's Department of Fish and Game completed the first P-R project: a five-mile dike in the Weber River delta to reduce the botulism that was killing large numbers of waterfowl. The project cost a grand total of $10,000 — $7,500 from the Federal Aid in Wildlife Restoration Act.

Pittman-Robertson was on its way.

In addition to the $1.5 billion provided to the states by P-R since 1937, the states have added $500 million in matching funds. There have been far too many benefits to name here, but a few should be mentioned. Some 4 million acres of wildlife habitat have been purchased outright, and an additional 40 million acres have been leased for wildlife management. These funds have also supported inventories of wildlife by species, number, age and sex to guide state wildlife agencies in setting hunting regulations, improving habitat, and spotting troubled species before they become endangered. In addition, new technology has been developed to augment research through such developments as dart guns and solar-powered radios and tiny transmitters used to track wildlife — even small birds.

Of all the benefits, one of the most important has been the creation of the science of wildlife management. One particularly significant policy supporting this benefit is the provision that wildlife personnel hired by state agencies with P-R funds must be trained and competent to perform their duties. This provision has helped create a professional approach to wildlife management and research.

One unexpected benefit of Pittman-Robertson has been the widespread restoration and protection of many nongame species (those which are not hunted for sport). Stated simply, when habitat has been saved for game animals, it has invariably provided shelter for nongame species, and many states — including North Carolina — have expanded their effort to include programs especially for nongame species.

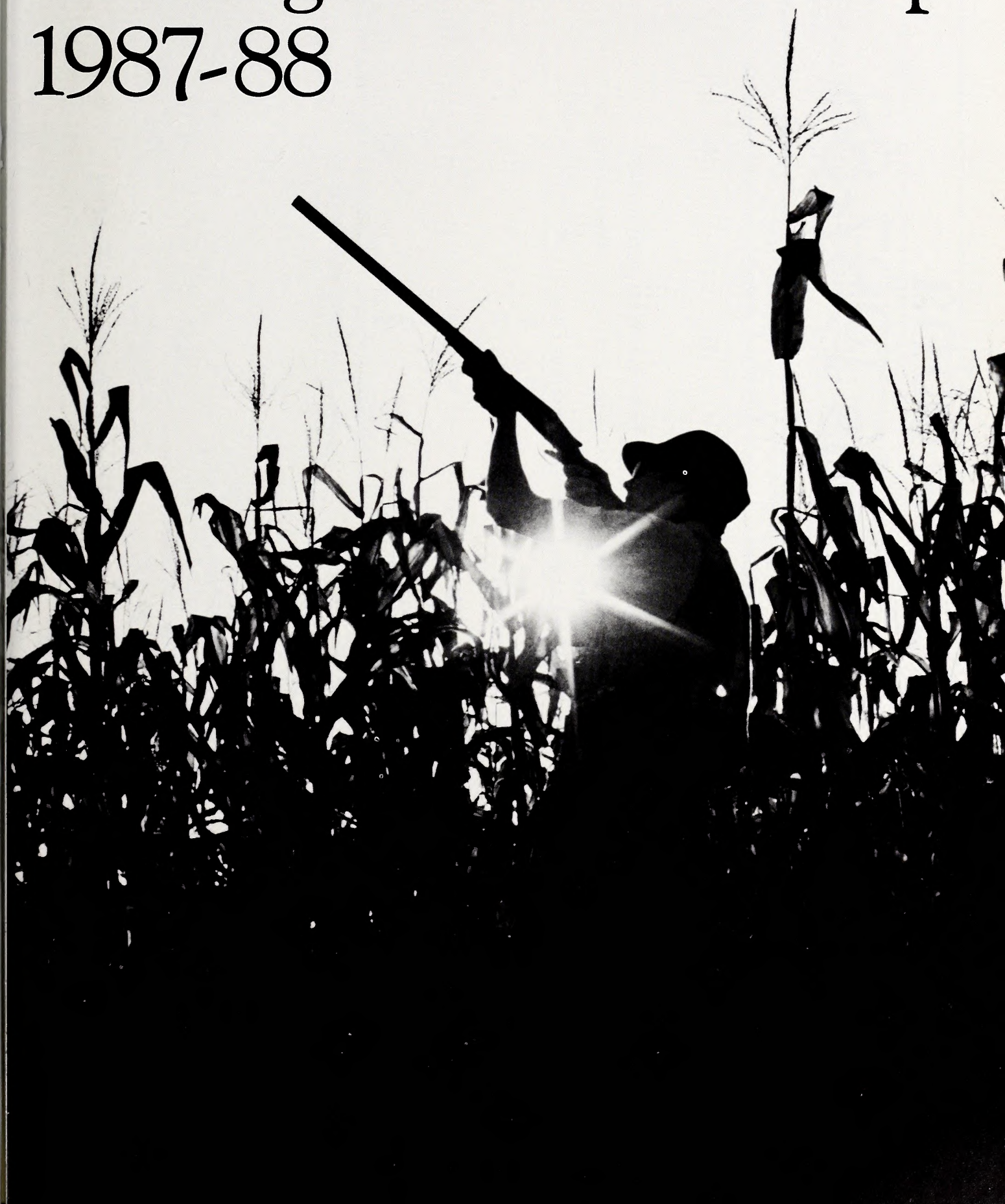
Pittman-Robertson has certainly had a major impact on North Carolina's wildlife. From 1937 through 1985, nearly $30 million has been received through P-R, and the results are clear for those who take even a casual look.

You may not be old enough to recall what it was like in the so-called "good ol' days" in 1900. But if you were around — and accurately observant — you would be able to see the difference. In deer, turkeys, wood ducks, beavers and many other species.

There is still much to do, and the loss of critical wildlife habitat continues at a rapid and destructive rate. Yet, where would we be without hunters and the $1.5 billion they have generated for wildlife management, habitat and research since 1937?

Happy Birthday, Pittman-Robertson. ⊠

Hunting Season Roundup 1987-88



North Carolina Hunting Seasons 1987-88

Species	Hunting Season	Daily Limit	Possession	Season
Dove	Sept. 5-Oct. 15 Nov. 23-Nov. 28 Dec. 18-Jan. 9 Shooting hours are from one-half hour before sunrise until sunset.	12	24	None
Crow	Thurs., Fri., Sat. of each week from July 1 to Feb. 29 and from June 1 to June 30 plus Labor Day and Christmas Day		No restriction	
Deer				
Bow and Arrow	Sept. 7-Oct. 3 (*Eastern)	2	2	***4
	Sept. 7-Oct. 3 and Oct. 12-Nov. 21 (*Western, except Yancey County)	2	2	4
	Sept. 7-Nov. 7 (*Central)	2	2	4
	Sept. 7-Nov. 14 (Northwestern)	2	2	4
Muzzleloading	Oct. 5-Oct. 10 (*Eastern) Oct. 5-Oct. 10 (Western) Nov. 9-Nov. 14 (*Central) Nov. 16-Nov. 21 (Northwestern)			
Gun	Oct. 12-Jan. 1 (*Eastern) Nov. 16-Jan. 1 (*Central) Nov. 23-Dec. 5 (*Northwestern) Nov. 23-Dec. 12 (*Western)			
Gun Either Sex and Special Either Sex	See *1987-88 North Carolina Inland Fishing, Hunting and Trapping Regulations Digest*			
Black Bear	**Oct. 12-Nov. 21 and Dec. 14-Jan. 1	1	1	1

	**Nov. 9 - Nov. 14 (See *Regulations Digest* for areas open)			
Wild Boar	Oct. 12 - Nov. 21 and Dec. 14 - Jan. 1	1	1	2
Gray Squirrel	Oct. 12 - Jan. 30	****8	16	75
Fox Squirrel	Oct. 12 - Dec. 31 (Only in 18 counties. Season closed elsewhere. See *Regulations Digest*)	****1	2	10
Quail	Nov. 21 - Feb. 29	10	20	None
Ruffed Grouse	Oct. 12 - Feb. 29	3	6	30
Raccoon and Opossum	**Oct. 12 (sunrise) - Jan. 30 **Oct. 19 (sunrise) - Feb. 29	No restriction on opossum. See *Regulations Digest* for bag limits on raccoon.		
Rabbit	Nov. 21 - Feb. 29	5	10	75
Rabbit — Box Trapping	Nov. 21 - Feb. 29			
Pheasant - Nonnative Male Pheasant Only	Nov. 21 - Feb. 1	3	6	30
Woodcock	Nov. 21 - Jan. 4	3	6	None
Bobcat	**Dec. 14 - Jan. 30 **Dec. 14 - Feb. 13	No restriction		
Fox	See *Regulations Digest*			
Groundhog	No closed season or bag limits.			
Wild Turkey Bearded Turkey Only	**April 9 - May 7	1	2	2
Migratory Waterfowl	Unavailable at this time; Federal regulations may be obtained by contacting license agent or writing N.C. Wildlife Resources Commission after October 1, 1987			

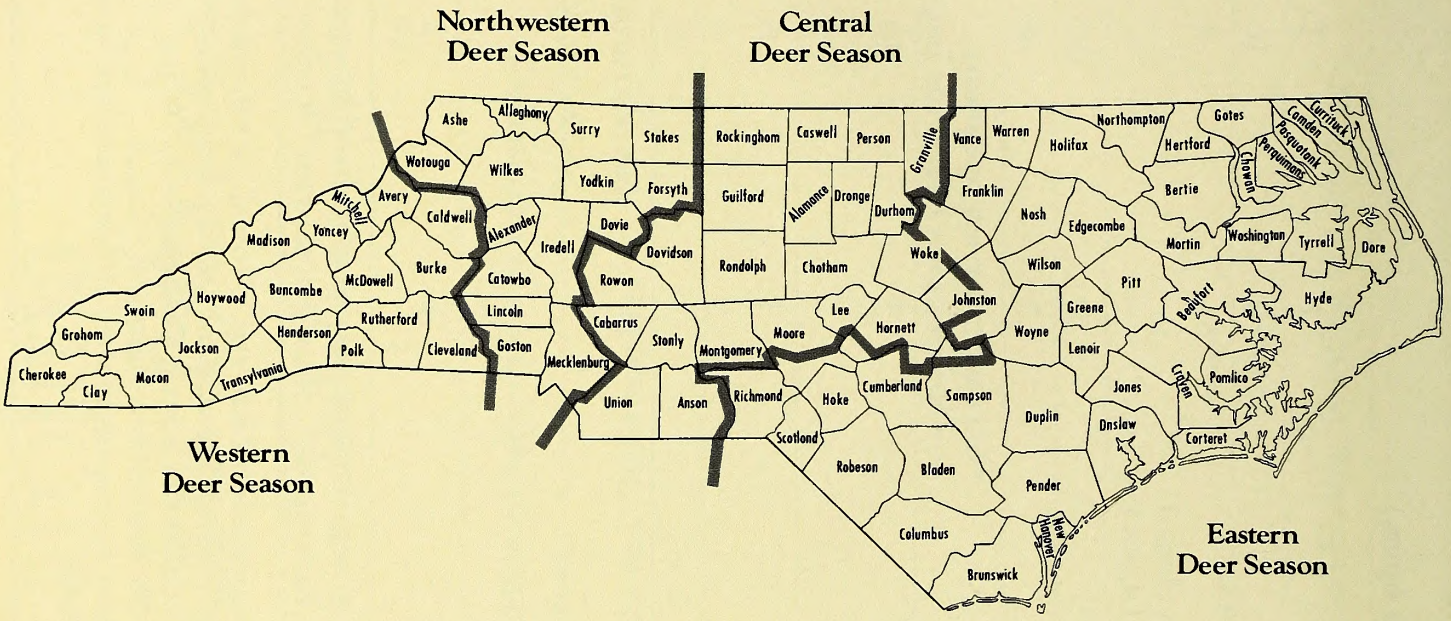
*See map on last page of this pull-out section for approximate boundaries of Eastern, Central, Northwestern and Western deer seasons; see *1987-88 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest* for complete details. For a copy of the *Digest*, write: N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, N.C. 27611.

**Season and bag limits vary from location to location; see *1987-88 Regulations Digest*.

***Eastern limit is 4 deer. An additional antlerless deer may be taken during established either-sex season in some areas.

****Total limit of 8 squirrels per day of which one can be a fox squirrel.

Boundaries for North Carolina Deer Seasons



North Carolinians are blessed with good hunting. Deer, black bear, wild boar and wild turkey are all found here, and are considered big game. There is also excellent hunting for squirrel, rabbit, quail, dove and grouse.

Licenses. The first thing any hunter needs is a license, and the best buy for the all-around outdoorsman is the sportsman's license. This license includes all appropriate permits for hunting big and small game and fishing. For those who hunt only small game, a statewide hunting license may suffice. However, permits for big game hunting and primitive weapons must be bought separately.

Perhaps the best option for the serious outdoorsman is to buy a lifetime license. Five of these lifetime licenses are available — including the sportsman's license for adults, youths and infants, and lifetime hunting and fishing licenses. The sale of these licenses supports the Wildlife Endowment Fund, with only the annual interest being used for wildlife conservation. Eventually, the fund will play a major role in supporting wildlife conservation in North Carolina. Licenses are available from license agents across the state, and information on lifetime licenses is available from license agents, Wildlife Commission employees, or by writing the N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Game Lands. Finding a place to hunt is generally no problem. North Carolina has over 2 million acres of public hunting areas enrolled in its game-lands system. For the price of a game-lands use permit (which is included in the sportsman's license), sportsmen can hunt or fish on these public lands. Game lands are located throughout the state, and information is available free by writing: Game Lands Maps, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Tagging Big Game. Big-game hunters should also be sure to tag and report all kills. Big game — which includes deer, black bear, wild turkey, and wild boar — must immediately be visibly tagged at the scene of the kill. These tags are provided when hunters purchase big-game permits or sportsman's licenses. Then, the hunter must report the kill to a nearby wildlife cooperator agent. There are over 1,500 wildlife cooperator agents located throughout the state — look for their diamond-shaped signs at country stores, sporting goods stores and other businesses. The cooperator agent will fill out a big-game kill report. A duplicate of this card is given to the hunter, and serves as a permit to possess the animal. Later, information from the big-game kill reports is used to determine harvests and other trends. Copies of the annual big-game harvest reports are available by writing to the Division of Wildlife Management, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Hotline. Wildlife belongs to everyone, and if you observe people breaking wildlife regulations in the field, call the Wildlife Commission's toll-free Wildlife Watch Hotline at 1-800-662-7137.

***Oil and** one or more whetstones are all that is needed to sharpen any knife. The oil prevents metal shavings removed during sharpening from clogging the pores of the stone.*

GETTING THE EDGE

A dull knife is not only useless, it's unsafe. Here's how to put a razor-sharp edge on a blade.

by Mark Taylor / photography by Ken Taylor

Few tools are as useful or pleasing as a truly sharp knife — or as dangerous as a dull one! Yet, many sportsmen will drop a goodly chunk of money on a fine hunting or pocketknife, but won't spend a few greenbacks on a whetstone to sharpen it.

Most surprising, perhaps, is the fact that those who go to the trouble to try to sharpen their knives are very likely to do a poor job of it. Few people really know how to sharpen a knife.

It's not particularly difficult to get a keen edge, but it takes a bit of technique. One master of that technique is Gene Abernethy of Fuquay-Varina. Gene served as chief of the Wildlife Commission's Division of Enforcement before he retired, but was best known around headquarters as the man to

Most knives *are sharpened to a bevel of 20- to 25-degrees. The exact angle isn't important, but the bevel must be consistent to produce a keen edge. To help maintain this bevel or angle along the full length of the blade, it may help to steady the blade by placing the tips of your fingers on the back edge. As you make each stroke, raise your elbow to maintain the same bevel all the way to the tip of the blade.*

A consistent bevel *must be maintained on both sides of the blade, and many knife sharpeners make several careful strokes on each side before turning the blade over and repeating the process. The blade should feel as though it's cutting a thin shaving off the top of the whetsone. Use plenty of oil on the stone, and don't be surprised to see the oil darken with microscopic steel shavings as the knife grows sharper.*

Gene Abernethy uses *coarse (Washita), medium (soft Arkansas), and fine (hard Arkansas) whetstones to sharpen his knives. Shape the bevel first with a coarse stone, then switch to a medium stone, and finish off with a hard stone to get a bright, keen edge. Good whetstones are likely to be fairly expensive, and many knife sharpeners prefer those made from natural stone quarried in Arkansas, although some synthetic oil and water stones are also popular. A whetstone should be at least as long as the blade; the longer the better.*

see if you needed a really sharp knife. He has been an avid knife collector for many years, and is a nationally known authority on old pocketknives.

One recent afternoon, Gene spread his tools out on the kitchen table and smiled with satisfaction as he deftly stroked the blade of an old, finely crafted German pocketknife along the length of a black Arkansas stone.

"Lots of people consider sharpening a knife a chore, but I find it relaxing," he said. "Occasionally, I like to spend an evening sharpening pocketknives, kitchen cutlery, and any other edged tools found around the house. That's not unusual among many knife collectors and whittlers who seem to enjoy sharpening their knives as much as using them."

On these pages are some tips that Gene passed on. Although he was sharpening small pocketknives when we dropped by, the same techniques are used for larger kitchen knives and many tools.

Keeping a knife sharp is more than just a matter of utility. Few tools are more dangerous than a dull knife because the blade is far more likely to slip and cause a nasty cut.

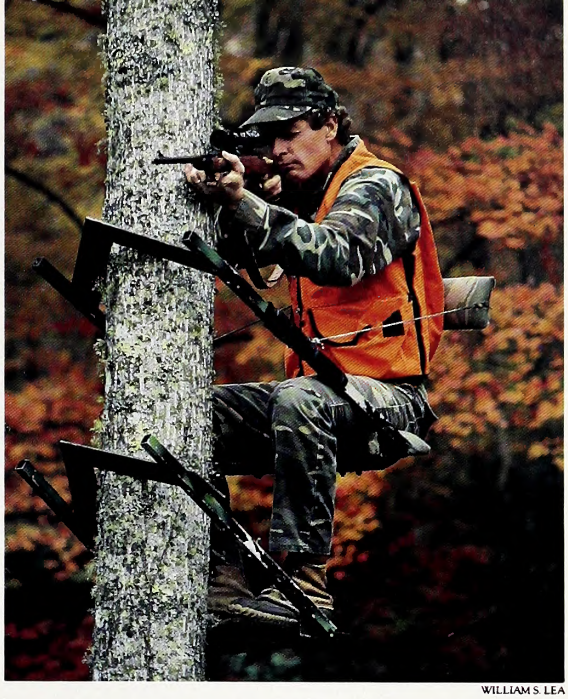
Even if you think you know how to sharpen a knife, take a look. You might pick up a useful tip. ⊠

The final test *— will it cut paper? A sharp knife will have an even, mirror-smooth bevel, and should slice cleanly through paper with little resistance. You can always tell when a blade has been sharpened by someone who doesn't know what he's doing. The sides of the blade will be scratched and worn, and there will be no distinct bevel at the cutting edge.*

Which Gun For Whitetails?

Is your best choice a rifle or shotgun? Here's what the experts say.

by Terry Shankle



WILLIAM S. LEA

***A scoped rifle** is favored by most tree-stand hunters except in thick cover.*

The whitetail deer is North Carolina's number one game animal. That statement may get your hackles up, especially if you hunt squirrel, quail, rabbit, turkey, grouse, waterfowl or any of the other game species for which we have hunting seasons. But the facts speak for themselves. In numbers of hunters, trips made afield, money spent, and emotions stirred, the whitetail deer is number one.

During the 1986-87 hunting season, 62,691 deer were reported harvested in North Carolina. That figure was compiled from the big-game tagging system where hunters are required, by law, to report their kills to nearly 1,500 wildlife cooperator agents scattered across the state. Of that total, 5,633 deer were taken with primitive weapons such as muzzleloaders and archery equipment. Another 137 were taken with handguns. The rest — a total of 55,752 deer — were taken with rifles and shotguns. To be more specific, 32,697 deer were reported taken with rifles, while 23,055 were taken with shotguns.

What influences a North Carolina deer hunter to choose a specific weapon? Is one type of firearm better than another for whitetail hunting in the state? Not even experienced deer hunters are likely to agree, but what follows may help the inexperienced hunter who is contemplating that crucial and often expensive decision — Which deer gun should I buy?

***A couple of** graceful leaps will quickly take this white-tailed deer out of range. Having the right gun will help make the difference between a clean kill and a miss.*

All deer hunters miss shots at deer! It may be the first shot you ever get, or it may be your 10th or 50th. Sooner or later, all deer hunters miss shots. It's disheartening enough to miss because of nerves or an unnoticed branch. But to have a shot and miss, or not be able to shoot at all because the weapon you're carrying isn't suitable for the situation, is practically unbearable.

It's also not possible, in most cases, to have two different weapons with you when your target appears. Every year thousands of deer hunters must make the split-second decision to take marginal shots or not. Having the correct weapon and confidence in its use can mean the difference between venison in the freezer, a miss, or worst of all, a crippled deer.

North Carolina's landscape is so varied that you can swim in the Atlantic Ocean in the morning, and that night stand atop Mt. Mitchell, the highest mountain in eastern America. But that same diversity can cause problems for the deer hunter who hunts different geographical areas of the state.

Eastern North Carolina is home to swamps and deer hunting with dogs. The cover is usually dense and deer being pushed in front of hounds are often moving at various speeds, all faster than an undisturbed walk. Quite often the best weapon for this type of hunting is the shotgun. Loads of buckshot fired at reasonably close range at moving deer have a much better chance of penetrating the heavy underbrush and reaching their mark than several randomly fired bullets.

"But the effective killing range of a shotgun using buckshot is no farther than 50 yards," says Capt. Wilton Pate, Safety Coordinator for the Wildlife Resources Commission's Division of Enforcement. After over 15 years as a hunter safety instructor and years of hunting, Pate speaks from experience.

"There are probably more deer wounded and lost in the 60- to 100-yard range with shotguns than with any other weapon," says Pate. "Sure, you can hit a deer with buckshot at 100 yards. But unless you hit the deer in the crucial head and neck area, the animal will not drop and will be all but impossible to track if wounded."

Some hunters may strongly disagree with the 50-yard maximum range Pate places on buckshot. Perhaps you've killed deer with buckshot at 60, 80, even 100 yards. If so, you were lucky. One or two of the buckshot found that perfect spot, but it's the exception rather than the rule.

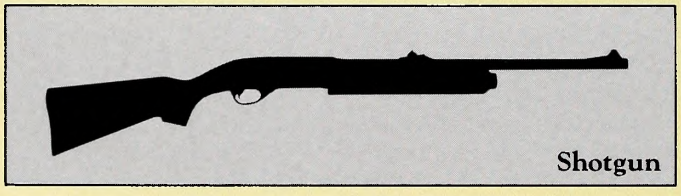
The shotgun of choice for eastern North Carolina deer hunters is the semi-automatic, 12-gauge, 3-inch magnum. "Twenty years ago you mostly saw guns that shot 2¾ inch shells because these were the same guns hunters used to hunt quail and rabbits," says Pate. "But today, it's the 3-inch magnum. With interchangeable barrels, it can also be used for turkey and waterfowl hunting. It's a versatile weapon with lots of power."

Pate says that No. 1, single 0, and double 0 buckshot are the most popular shot sizes for whitetail. Studies show that a barrel with a cylinder bore, or no choke at the muzzle, is best for shooting buckshot because cylinder bores least disturb the roundness of the lead balls, letting them travel in a straighter line after leaving the muzzle. The buckshot in the load stay closer together, meaning you have more buckshot in the killing pattern.

WILLIAM S. LEA

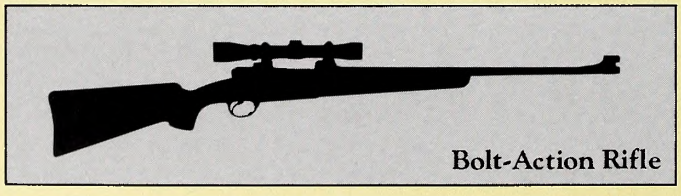
Top Guns

Choosing the best gun for hunting white-tailed deer in North Carolina may ultimately boil down to personal preference, but here are some factors to consider.



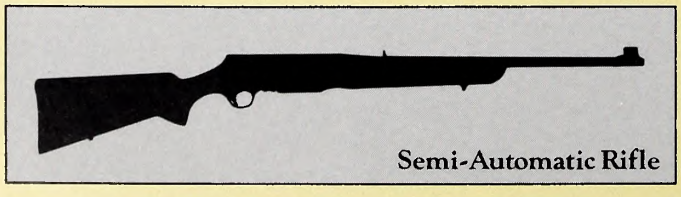
Shotgun

In heavy cover at relatively close ranges or when hunting with dogs, a shotgun is often preferred. You're handicapping yourself to try to hit a running deer in the thick undercover of the Coastal Plain with a scoped rifle. Most agree that the ideal shotgun for deer is a 12-gauge, 3-inch autoloading magnum shotgun and buckshot. An open or relatively open choke is recommended, either cylinder bore or improved cylinder.



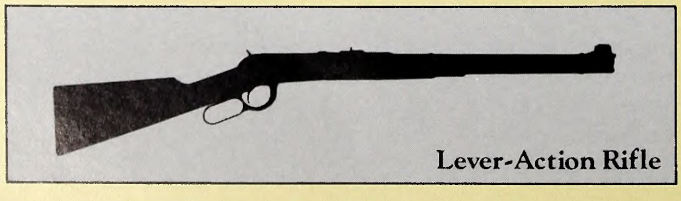
Bolt-Action Rifle

Most rifle enthusiasts agree that for still hunting in the more open Piedmont and mountain regions, or on the edge of large eastern fields, a bolt-action rifle with suitable scope is hard to beat for accuracy, reliability and tradition. You won't need a caliber larger than .30-06, and shouldn't choose one smaller than .243. Other suitable calibers include, but aren't limited to, .308, 7mm, .270.



Semi-Automatic Rifle

Semi-automatic rifle enthusiasts argue that their choice will shoot faster if needed, and if there is any loss of accuracy, it would be so insignificant as to be undetectible in the field with a properly scoped rifle. The same calibers are recommended as for the bolt-action rifle.



Lever-Action Rifle

The lever-action .30-.30 rifle with iron sights is a traditional favorite that is adequate at relatively close ranges, and shoots a bullet that resists deflection by brush. Even so, more and more rifle hunters are opting for the firepower and convenience of a semi-automatic rifle or the accuracy of a bolt-action rifle in calibers other than .30-.30.

***Stillhunters in** the more open terrain of the Piedmont and mountains usually opt for a rifle in hopes that a big buck like this one will offer a shot.*

KEN TAYLOR

***A well-equipped deer hunter** is likely to have several guns to fit varying conditions. A shotgun (top) with buckshot is usually the pick in thick cover or when hunting with dogs. The lever action (center) is still an old favorite, but more and more hunters are switching to scoped bolt-action (bottom) or semiautomatic rifles.*

"And don't forget the rifled slug," Pate adds. "Its power is awesome out to 80 yards. With practice, a slug barrel equipped with rifle sights can very consistently shoot 5- to 6-inch groups at 80 yards."

Not everyone follows the hounds, and even if they do, many like a weapon with greater range than a shotgun. There are also thousands of Tar Heel hunters who quietly hunt the edges of the large agricultural fields in eastern North Carolina from tree stands. Flat shooting rifles with scopes are a must for that type of deer hunting.

"Over the years, I've seen a definite increase in the number of rifles used in eastern North Carolina as well as a change in the type of rifle," Pate says. "Twenty years ago, the standard was still the classic lever action, .30-.30. Today, more deer hunters in the east use the semi-automatic, shooting calibers from .243 up to .30-06, and nearly all the rifles are scoped now. Shots 100 yards and longer are consistently made using these weapons. Still, the major problem hunters encounter when taking long-range shots across flat ground is misjudging the distance to the target. They also shoot beyond their capabilities with the weapon. A correctly scoped and sighted-in rifle will shoot where it's aimed. The fact is, many hunters, under hunting conditions, can't shoot up to the capabilities of the weapon they carry."

Practice is the answer. It prepares the hunter for recoil, and also lets the hunter know how far he can consistently shoot into the kill zone. A good hunter knows his limit and will not take shots beyond that point, and he also makes certain he's shooting safely and knows what's behind the bullet impact area.

Farther west, primarily in the Piedmont and mountains, the weapon of choice is almost exclusively the rifle. Hunting is done from tree stands near trails or feeding areas. The deer are less disturbed and walk at a more leisurely pace, hopefully giving the hunter time to pick his shot. Some hunters choose a bolt-action rifle, citing superior accuracy, and indeed a bolt-action rifle will shoot more accurately than a semi-automatic if the shooting is done from a bench rest using sandbags or other stabilizers. But under hunting conditions, taking shots at the normal distance of 100 yards or less, the bolt-action has no real advantage over the semi-automatic. A definite plus on the side of semi-automatic is that you can shoot faster because the weapon reloads itself. But faster isn't better unless there is accuracy, and that's up to the man holding the rifle.

While the vast majority of shotguns used for deer hunting are 12 gauge, there is much more diversity in rifle calibers. There is no statewide law to limit the minimum caliber of rifle cartridge that can be used to deer hunt, but hunters should be aware that some counties have laws that restrict rifle use and caliber. (Refer to the *North Carolina Inland Fishing, Hunting, and Trapping Regulations Guide* for these counties.)

The most popular rifle calibers for hunting deer in North Carolina are the .243, .270, 7mm, .308, and the .30-06. Anything smaller increases the risk of cripples. Anything heavier is unnecessary for North Carolina whitetails. Of these calibers, the .30-06 dominates the market. Long the standard caliber for the U.S. military until the .223 was adopted in the 1960s, the .30-06 is still a favorite because of the great variety of ways it can be loaded. Its capabilities extend from varmits to any big-game animal on the North American continent. This last point should be taken into consideration if you're purchasing a new rifle and plan to use it not only in North Carolina, but perhaps on an occasional trip to the western states or elsewhere. Perhaps the greatest drawback to the .30-06 is its recoil. Unless you shoot periodically the first few practice shots in the fall can be real eye-openers. That recoil has caused some hunters to move down to less powerful .243 and .270 rifles.

One other type of rifle that has experienced a revival in recent years is the single shot. Sold in a variety of calibers, these rifles are patterned after the highly accurate single-shot rifles used by hunters in the 1800s. Their popularity parallels the resurgence of muzzleloaders, and some hunters enjoy the extra challenge of having a weapon that fires only one shot.

So, which is the best deer gun for you? Obviously, there is no one best gun for every hunter. Big-game hunting has changed in North Carolina over the past several decades as deer herds have spread and turkey flocks have returned. Most hunters constantly evaluate their equipment, and if you have not done so in recent years, you should.

Finally, Wilton Pate has this advice for every deer hunter.

"Practice before going hunting. Experiment with different weight bullets and loads to see what shoots best for you in your rifle. Pattern shotguns with various loads. Practice judging distances. Shoot at moving targets if that's what you expect when you're hunting. Become very familiar with the trigger pull and recoil of your firearm.

"But above all, for safety's sake and effectiveness, know where your weapon will shoot at different distances," adds Pate. "When you decide on a shot, make sure the opportunity is there for a quick, clean kill. It's your responsibility as a sportsman to preserve the heritage so that future generations can enjoy it." ⊠

Blaze Orange Becomes Law

The wearing of blaze orange will soon be mandatory for some types of big game hunting with firearms in North Carolina.

by Jim Dean

This summer, the State Legislature passed a law requiring the mandatory wearing of blaze orange for certain types of big-game hunting in North Carolina. Any person violating this law after October 1, 1987 during the current big-game hunting season will be given a warning only. However, beginning next year on October 1, violators will be charged with an infraction which carries a $25 penalty.

How will this law affect you? Aside from the fact that it could save your life, it is a law you should thoroughly understand because the blaze-orange requirement will have an impact not only on hunters, but also landowners and even citizens who do not hunt.

There have been, and may still be, some misconceptions about the law. Specifically, the law reads as follows:

"Any person hunting bear, deer or wild boar with the use of firearms must wear a cap or hat on his head made of hunter orange material or an outer garment of hunter orange visible from all sides. Hunter orange material has a daylight fluorescent orange color. This section does not apply to a landowner, his spouse, or dependents residing with him, who are hunting on land held by the landowner."

The law is aimed at big-game hunting since these hunters employ the highest powered weapons and statistically have the highest accident rate. The law applies to all firearms used for big-game hunting, including muzzleloaders.

However, the law takes into account that some types of hunting are safer and would also be adversely affected by a blaze-orange requirement. The law, for example, does not place a blaze-orange requirement on hunters, even big-game hunters, who use a bow and arrow. Nor does it require turkey hunters to wear blaze orange since turkeys can detect color, and turkey hunting traditionally relies upon the use of camouflage and calling from a blind or concealment to attract gobblers within range. Deer are colorblind and see everything much as we see a black and white photograph.

The blaze-orange requirement also does not apply to those who hunt quail, rabbits, squirrels, raccoons, or other small-game species. Nor does it apply to waterfowl, dove or other migratory bird hunting.

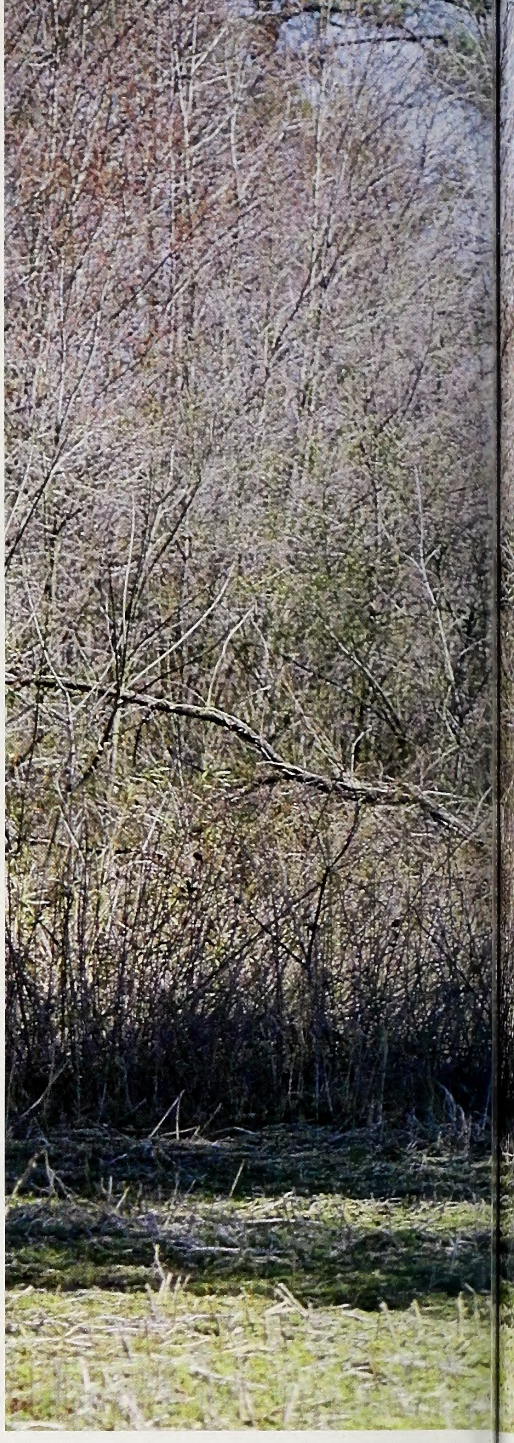
In the months before the passage of the blaze-orange law, it was clear that many non-hunters — and some hunters — were uncertain how the law should be applied. For example, several writers complained that a dove hunter pictured on the cover of this magazine was not wearing blaze orange. However, doves are not colorblind, and to wear blaze orange in a dove field would simply ensure that no dove would ever fly within range. Waterfowl and turkey hunters had similar concerns, and the final law was drafted to try to take such matters into account.

Experts still recommend, however, that all hunters consider wearing blaze orange in the woods and fields to and from their hunting spots since the danger is greatest at such times.

"Even though blaze orange is not required for some types of hunting, we would certainly recommend its use in many cases," said Col. Harold Ragland. "It's not going to frighten a bobwhite quail or rabbit, but it can certainly help you and your fellow hunters keep up with each other when you're hunting in thick cover.

"If you're swinging a shotgun on a fast-moving quail on the coveyrise, your eye is more likely to pick up the color of blaze orange if you happen to swing the gun barrel towards a companion," said Ragland. "Rabbit hunters should also wear it because they frequently hunt in thick cover, and it's easier to keep up with the position of your companions. When a rabbit is running ahead of a pack, it's easy to lose track of others.

"I also wear it when I'm hunting alone because I am not always certain who else might be hunting in that area," added Ragland. "Most hunting accidents occur because the shooter has not fully identified



***The high visibility** of blaze orange clothing as compared with other colors furnishes a decided edge in safety, and the wearing of blaze orange will not adversely affect a deer hunter's chances. Deer are colorblind and view their surroundings as we would a black and white photograph.*

KEN TAYLOR

his target. He's looking for a deer and he sees movement and a flash of brown. It might be a deer, or it might be you or me hunting quail in a brown coat or taking a late afternoon walk. Almost every hunter would wait to be sure, but occasionally you have someone who unwisely takes a chance, or who thinks he's sure of his target only to find out too late that he was wrong. That's why I recommend that even nonhunters consider wearing blaze orange in certain areas when the seasons are open."

One fact frequently overlooked is that hunting is statistically one of our safest sports—far safer, for example, than swimming, boating and many other popular pastimes. Indeed, you are at far greater risk driving to your hunting spot than you are after you arrive there.

Still, there is strong evidence that the requirement to wear blaze orange while hunting big game with firearms makes the sport even safer. North Carolina is the 39th state to enact some form of blaze-orange requirement, and the statistics in many other states on the effectiveness of this law are impressive. Some states which averaged several fatalities annually prior to enactment have not had a fatality since requiring, under certain circumstances, the use of blaze orange.

"The law is no different from a seat belt or life-jacket law," says Ragland. "Some have objected to it saying that the colors they wear should be their choice, and if they want to take a chance, they should be permitted to do so. They may be willing to take the chance, but what about the others who are affected if someone shoots them, or they shoot someone else? Does their family have a vote? What about the rest of us who support health care and pay insurance rates that are influenced by that decision? How about the person who pulls the trigger? Shooting someone would be a terrible thing to have on your conscience. It's clear that it's not simply a case of personal freedom."

Ragland is hopeful that hunters across the state will enthusiastically wear blaze orange, not simply because it's the law, but because it makes sense. ⊠

She Carried The Wildlife Message

Lunette Barber Leaves Legacy Of Conservation

Written and Edited by Mark Taylor

JACK DERMID

Leaving A Legacy: *Lunette Barber (center) devoted much of her life to spreading the gospel of conservation as a teacher and later an education specialist with the Wildlife Commission. She recently died at the age of 82. Here, she attends a 1961 meeting of the Junior Audubon Club at the Tarboro Elementary School.*

Dear *Wildlife:*

There have been very few folks in the overlapping fields of ecology, environmental management and wildlife conservation about whom I've felt compelled to write. Lunette Barber is certainly one of them, and it's a shame that this wasn't written before her death in early June. For those who have read this magazine and who have kept up with wildlife for the last 35 years, her teachings and philosophy have made a profound difference.

I well remember the first time I met Lunette in 1950, sitting in her office on the first floor of the Revenue Building which was then the headquarters of the young Wildlife Resources Commission. She claimed that she really didn't need an office — she was never in it, but rather on the road preaching "wildlife" in a style that will never be matched. I don't recall what kind of hat she had on, but I know that it was there; this was one of her trademarks.

To say that Lunette was one of a kind is putting it mildly. I can honestly say that in my 30 years as a professional conservationist, I've never known anyone who has had a greater impact for good in the wildlife conservation field than Lunette Barber. Time was—and not that long ago—when you could stop at most any crossroads store and cetainly any school, from Nags Head to Bryson City, and find someone who knew Lunette and her conservation story. Her influence on the lives of thousands of North Carolinians will live as her true lasting tribute.

She was at home with everyone: a kindergarten class in Columbus County, a luncheon with the governor at the mansion, a gathering of farmers at a soil conservation field day in the pouring rain, with a group of youngsters at Camp Millstone.

Lunette loved to talk, but unlike a lot of us, when she talked she said something; and now many of us wish that we had listened more attentively. North Carolina and its natural resources are in better shape because of the tireless efforts of "Miss Lunette." We'll be seeing you, Lunette, and until then, we'll try to keep North Carolina's soil and minerals, its forests, waters and wildlife the way you taught us.

— Duane Raver
Cary

Editor's Note: Lunette Barber, a native of the Cleveland Community in Johnston County, died recently at the age of 82. She worked 41 years for the State of North Carolina, first as a teacher in Johnston County and at the N.C. School for the Blind, and from 1949 through her retirement in 1968 as a conservation educator for the Wildlife Commission. Duane Raver, who retired as editor of *Wildlife In North Carolina* magazine in 1979, worked with her for many years.

Money Funds Restoration Projects

Contributions Increasing From Nongame Tax Checkoff

Interest in nongame wildlife is continuing to grow judging from contributions to the North Carolina Nongame and Endangered Wildlife Fund. This fund is supported largely through a checkoff on state income tax returns, and citizens may designate a portion or all of their refund for the management of nongame and endangered wildlife in North Carolina.

Only the first-quarter figures for 1987 were available when this issue of *Wildlife In North Carolina* went to press; however, at the end of the first quarter citizens had donated $120,468 to the fund through the checkoff. This represents a $36,000 or roughly 30 percent increase in contributions compared to the first quarter of 1986.

"That's quite an increase, and probably reflects a growing awareness and appreciation for nongame wildlife," said Debbie Paul, section manager of the Wildlife Commission's nongame program. "We're not sure that this increase will be maintained in later returns because many people were confused by the new tax laws, although they do not go into effect until next year. However, we're sure that we'll at least meet, and probably exceed, the total of $331,250 that was contributed through the checkoff in 1986. Contributions to the Nongame and Endangered Wildlife Fund have increased every year, and experiences in other states show that this is unusual. We appreciate the support we've received, and would like to thank everyone who has contributed the fund."

Checkoff funds support a variety of programs. These include restoration projects for endangered bald eagles and peregrine falcons, management of threatened loggerhead sea turtles, and the introduction of a variety of conservation-education programs into the state's schools.

Fall Conservation Retreat Slated

Surf fishing, barrier-island management, photography, and astronomy are a few of the interests at this year's fall Conservation Retreat. The event is sponsored by the N.C. Wildlife Federation, and will be held from October 2-4 at Pine Knoll Shores. Co-sponsors are the North Carolina Sea Grant program and the N.C. Office of Marine Affairs, and programs will be held at the North Carolina Aquarium at Pine Knoll Shores.

A field trip aboard the Duke University Marine Laboratory's research vessel is also scheduled.

For more information, write "Fall Retreat," N.C. Wildlife Federation, P.O. Box 10626, Raleigh, N.C. 27605.

Great Places To Visit

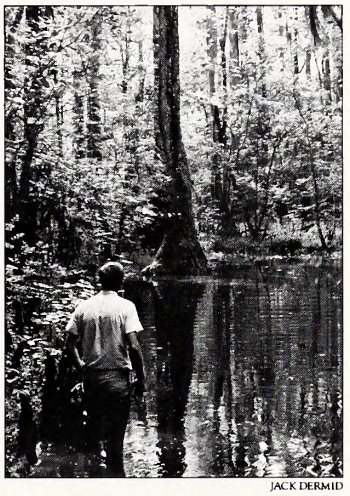
Unique N.C. Natural Areas Featured In Directory

Have you ever wanted to visit some of North Carolina's finest natural areas? If so, you're in luck. The North Carolina Natural Heritage Foundation recently published a guide to 108 of the state's best natural areas which are accessible to visitors.

The 98-page booklet, entitled *A Directory To North Carolina's Natural Areas*, provides introductions to the natural habitats and landscapes of each region of the state, and includes brief descriptions (including location and unique natural features) of each area within the region. These natural areas are located on federal or state lands, preserves owned by private conservation organizations such as the Nature Conservancy, and privately owned property. Virtually all of the habitats found in the state—from coastal swamps and blackwater rivers to mountain bogs — are included.

The directory is attractively illustrated with color and black and white photographs, and offers an excellent introduction to the ecotypes and geology of the state in addition to specific information on each site. Best of all, it fits easily into the glove compartment of a car or a small daypack for an afternoon's exploring.

Proceeds from the sale of the directory will be used for environmental education and land-protection projects by the nonprofit N.C. Natural Heritage Foundation. Single copies may be ordered for $5 (includes tax and mailing) from the N.C. Natural Heritage Foundation, P.O. Box 11105, Raleigh, N.C. 27604. Information on bulk orders is available from the same address.



JACK DERMID

Too Good To Miss: *Some of the state's finest near wilderness is included in* A Directory To North Carolina Natural Areas *recently published by the N.C. Natural Heritage Foundation. The directory includes information on 108 areas open to the public as well as descriptions of the ecotypes and unique feature of each region of the state.*

Damaged By High Water

Kerr Lake Fishing Bridge Rebuilt

Fishermen at Kerr Lake are among the first North Carolina anglers to benefit from the work of one of the Wildlife Commission's new development crews. The fishing bridge on S.R. 1308 near the Nutbush Recreation Area has just been reconstructed — replacing the wooden planking with a steel catwalk. This change should ease maintenance problems and increase the safety of the bridge.

Cape Carnes, Piedmont supervisor for the Division of Boating and Inland Fisheries, said the wooden planks have had to be replaced frequently because of damage from high water and vandals who rip up the boards for firewood. The railing of the bridge was also damaged during the spring flooding when it was rammed by boats while under water, and there have been accidents in the past when winter fishermen have slipped on the icy bridge and fallen over the rail.

With the reconstruction, the bridge is again a safe and valuable asset to area fishermen.

The Nutbush fishing bridge was built by the Department of Transportation several years ago and has been maintained by the Wildlife Commission ever since. It is the only fishing bridge of its kind in the state.

Funding for the bridge improvements and the new fisheries crews came from the Wallop-Breaux amendment, which added new items to the list of fishing equipment subject to the federal excise taxes under the Dingell-Johnson Act. This money is divided among all state wildlife agencies for fisheries management programs.

— Jane Rohling

Lifetime Licenses Sold

Employees Boost Endowment Fund

In only seven days of selling in an agency contest, 15 Wildlife Commission employees generated more than $55,000 for the N.C. Wildlife Endowment Fund.

The Wildlife Resources Commission voted last spring to allow the use of the funds donated by the Chairman's Advisory Committee to provide a free lifetime license for each of the first 15 commission employees who sold 10 lifetime licenses apiece.

The following were contest winners: District Capt. Sterling Baker, wildlife enforcement officer Jerry Brothers, Safety Lt. Bruce Byrd, Sgt. Gary Early, Sgt. Doug Flake, Master Officer George Ford, officer John Hall, Lt. Tyson Laney, Master Officer Bill Lester, Master Officer John Massey, Col. Harold Ragland, officer Timmy Sasser, Sgt. Danny Smith, District Capt. Charles J. Smith and wildlife biologist Dennis Stewart.

"I hope you are as proud as I am of what you have just accomplished," said Eddie Bridges of Greensboro, Wildlife Commissioner for District 5. "As a result of your participation in the contest, you have helped generate more than $55,000 for the N.C. Wildlife Endowment Fund in a time frame of only seven days. I commend you for responding in such an enthusiastic way."

Memorial Unveiled At Caswell

Dixon Honored For Wildlife Work

On Saturday, June 13, over 100 conservationists from several states gathered with the family of the late L.A. Dixon at the Caswell Gamelands Depot for the dedication of a memorial to one of the state's most prominent wildlife supporters.

L.A. Dixon, who died in 1985, was a pioneer in the restoration of the wild turkey in North Carolina. At the time of his death, he was a conservation director of the N.C. Wildlife Federation and vice president of the National Wild Turkey Federation. He was also chairman of the advisory committee to J. Robert Gordon, former chairman of the N.C. Wildlife Commission, and was named Sportsman of the Year by the Federation in 1980.

Wayne Bailey, retired N.C. Wildlife Commission turkey project leader and a long-time friend of Dixon, described him as "a front-line conservationist, one who, as a hunter and fisherman, was emotionally stirred by the squeal of a wood duck, or the gobble of a wild turkey on a misty morn."

"He looked to the future," added Bailey, "and wanted his sons and grandsons to long be able to stalk the white-tailed deer, or thrill to the rhythmic beat of the pileated woodpecker, or the the whir of rising quail. His devotion to support them was exemplified by his investments in time and money and habitat improvement on lands he owned or controlled."

When members of the N.C. Wild Turkey Federation approached the Wildlife Commission requesting permission to erect a memorial to L.A. Dixon on the Caswell Gamelands, the Commission was glad to approve and endorse the project.

"The Commission felt very strongly that L.A.'s commitment, and his dedication here in North Carolina, deserved some kind of special recognition," said former Commission Chairman Jerry Wright. "The Commission is proud to have the monument put here on the property."

The memorial to Dixon stands in the shade of two large trees in front of the Caswell Gamelands Depot. It reads:

"In recognition of L.A. Dixon, Jr., Mebane, N.C., 1933-1985, private citizen and conservationist who gave of himself for the sport he loved. His efforts and leadership on behalf of the wild turkey merit the respect and thanks of all North Carolina sportsmen."

On behalf of the Dixon family, Mrs. Edna Dixon thanked the Wildlife Commission and the friends and colleagues of her husband who were responsible for erecting the memorial.

"L.A. loved Caswell County," Mrs. Dixon said. "He always said when he died he'd just as soon be put on a pine ridge in Caswell County as anywhere else. I guess this is the closest place to it, under this beautiful holly tree. It's just perfect."

— Jane Rohling

Hunting And Fishing Day Set

Tar Heel sportsmen will be honored on Saturday, September 26, proclaimed by Governor James G. Martin as "National Hunting and Fishing Day" in North Carolina. Wildlife clubs across the state will be hosting National Hunting and Fishing Day events. Watch for details in local newspapers.

Governor Martin's proclamation follows:

"More than one million North Carolinians participate in the popular sports of hunting and fishing, traditionally constituting one of the largest groups of citizens concerned about our wildlife resources and the environment we share with these resources.

"Most of the support for sound management and conservation of our wildlife resources is paid for by hunters and fishermen, who have also led the quest for clean air, clean water, and a future for wildlife in North Carolina.

"Now, THEREFORE, I, James G. Martin, Governor of the State of North Carolina, do hereby proclaim September 26, 1987, as 'National Hunting and Fishing Day in North Carolina' and commend this observance to all our citizens."

KEN TAYLOR

Honoring A Tradition: *Tar Heel sportsmen were recently honored by Governor James G. Martin when he proclaimed Saturday, September 26, as National Hunting and Fishing Day in North Carolina. Many wildlife clubs will be sponsoring special Hunting and Fishing Day events, so watch for details in your local paper.*

Field Notes

Rails, Moorhens, and Gallinules	September 7-November 14
Moorhens and Gallinules	15 daily / 30 possession
Clapper and King	15 daily / 30 possession
Sora and Virginia	25 daily / 25 possession
Common Snipe	November 13-February 27 (106 days)
	8 daily / 16 possession

Other seasons are listed in the 1987-88 Hunting Season Roundup on pages 16 and 17.

First Time In 30 Years

Peregrine Falcons Nest In Mountains

Endangered peregrine falcons are nesting in North Carolina thanks to a restoration project conducted by the Wildlife Commission's Nongame and Endangered Wildlife program. This project is supported solely by the N.C. Nongame and Endangered Wildlife Fund, largely through a checkoff on state income-tax returns.

"The big news this year is that a pair of peregrine falcons nested in North Carolina for the first time in 30 years," said Debbie Paul, section manager of the Commission's nongame and endangered wildlife program. "These nesting peregrines are two of the birds we released a few years ago.

"Unfortunately, when we checked the nest we found that the chick had died and the sole egg was infertile, which is not unusual. However, we quickly obtained a live chick from a captive breeding program conducted by The Peregrine Fund, and placed it in the nest. The birds took to the chick, and raised it. Hopefully, the adult birds will nest again next year, and the young bird will 'imprint' to the mountains and return when mature."

Commission nongame biologists also released 17 young peregrine falcons from several locations in the mountains this spring.

"We're starting to see quite a few of the birds we released in the past few years return to the mountains," said Paul. "Many of these are paired birds, which is great news because they may begin nesting in the next few years. Also, peregrine falcon restoration projects in West Virginia, Virginia, Tennessee and South Carolina are going well, and these birds are beginning to expand their range into North Carolina. The elimination of some of the persistent pesticides used in the past has cleaned up our environment, and efforts to restore these magnificent birds throughout their native range in the southern Appalachian Mountains are succeeding."

A project to restore bald eagles in coastal North Carolina is also being conducted through the nongame program. Nine bald eagles were released at the Lake Mattamuskeet National Wildlife Refuge in Hyde County last summer. These birds don't mature until they are about five years old, and biologists don't expect to see them return as quickly as peregrine falcons. Eight of the bald eagles released this year were obtained from Alaska, and the other came from Chesapeake Bay in Virginia. This is the first time that Alaskan birds have been released in North Carolina.

While bald eagles are being restored on the coast, however, the best place to see them is at the N.C. 751 bridge that crosses Lake Jordan near Raleigh. Bald eagles, probably from Florida, began using Lake Jordan as a "summer roost" several years ago.

BRYANT TARR

More To Come: *Peregrine falcons have nested in the North Carolina mountains for the first time in 30 years, and birds released over the past few years are returning.*

"The use of Lake Jordan as a summer roost by bald eagles keeps increasing despite a steady rise in recreational use of the lake for boating, fishing and other sports," said Paul. "On May 17, for example, the New Hope Audubon Society conducted an eagle count on Jordan lake, and observed 54 birds. And the number of eagles using the lake usually doesn't peak until late summer. We've been very pleased with how the public has responded to the birds. They've enjoyed watching the eagles, and there have been no problems with harassment or other incidents."

Bald eagles to the North are also doing well. Wildlife biologists with the Virginia Commission of Game and Inland Fisheries report that bald eagles on Chesapeake Bay and Virginia's coastal rivers had "unbelievable" nesting success this spring. In Virginia alone they observed 74 active nests compared to 66 last year, and also counted 105 chicks in the nests.

The Wildlife Endowment Fund Report

The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife In North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Status on June 30, 1987

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	39,372	$11,168,612.10
Lifetime Hunting License	188	38,809.56
Lifetime Fishing License	2,958	500,313.54
Lifetime Subscriptions to Wildlife in N.C.	1,111	136,845.47
Contributions	—	88,403.51
Fund Total		$11,932,984.18
Total Interest Earned	$1,828,968.71	

Calendar Of Events

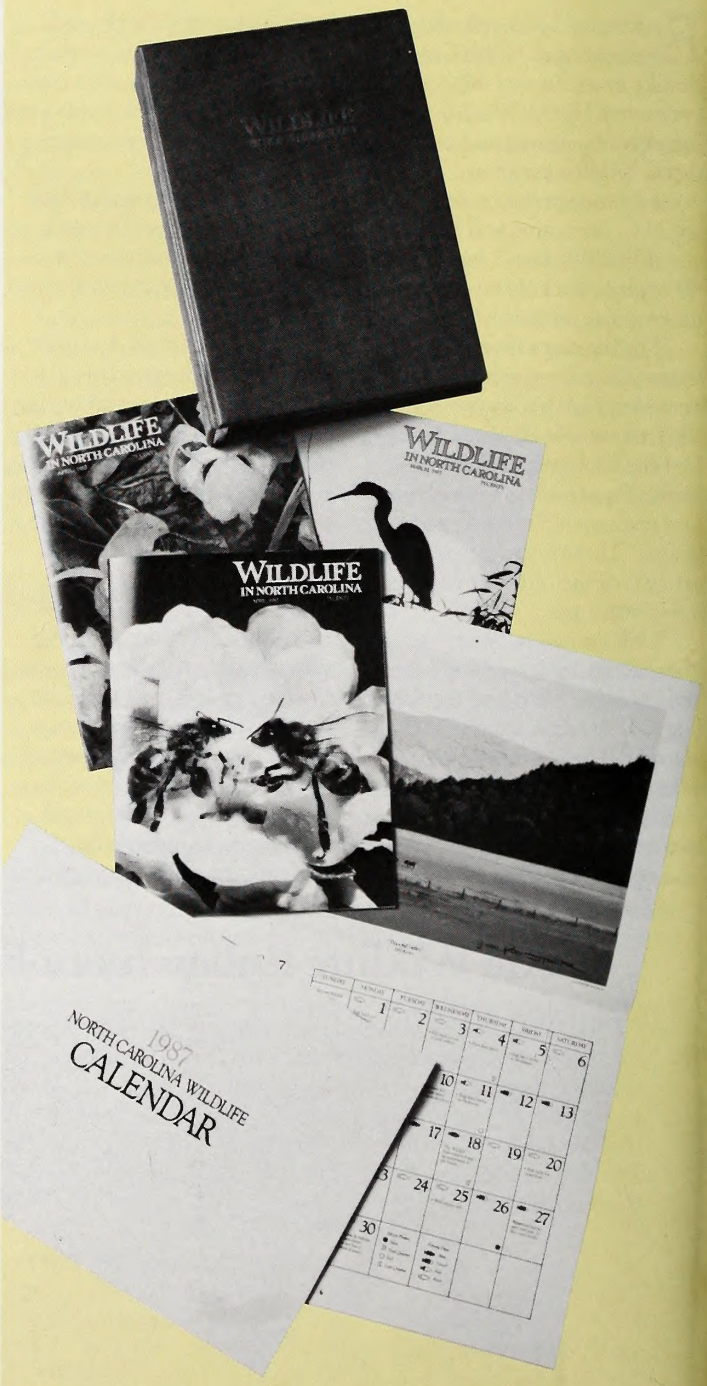
September 5-13
French Broad River Week in Transylvania, Henderson, Buncombe and Madison counties. This week-long celebration includes region-wide river clean-ups, hikes, raft and canoe trips, and River Fest, a festival held on the riverfront in Asheville on September 12-13. For more information write French Broad River Week, Land-of-Sky Regional Council, 25 Heritage Drive, Asheville, N.C. 28806.

September 19-20
Currituck Wildlife Festival at Currituck County High School in Barco. Featured will be competition and exhibits by some of the nation's finest waterfowl painters and carvers. Old decoys and other waterfowl memorabilia will also be on display. In addition, the North Carolina State Duck and Goose Calling Championships and the World Swan Calling Championships will be held. For more information write to the Currituck Wildlife Guild, P.O. Box 91, Shawboro, N.C. 27973.

September 26
Mountain Heritage Day at Western Carolina University in Cullowhee. Features traditional music, dancing, storytelling, crafts and other events.

September 30-October 2
Marine Expo '87 at UNC-Wilmington in Wilmington. Features a variety of events and activities dealing with marine science. For more information contact UNC-Wilmington, 601 S. College Rd., Wilmington, N.C. 28403.

THE BEST OF ALL OUTDOORS...



The 1988 North Carolina Wildlife Calendars Are Here!

For the past two years, these calendars have sold out quickly. Order yours today by returning the form below with your check or money order to: 1988 CALENDAR; N.C. Wildlife Resources Commission; 512 N. Salisbury Street; Raleigh, NC 27611.

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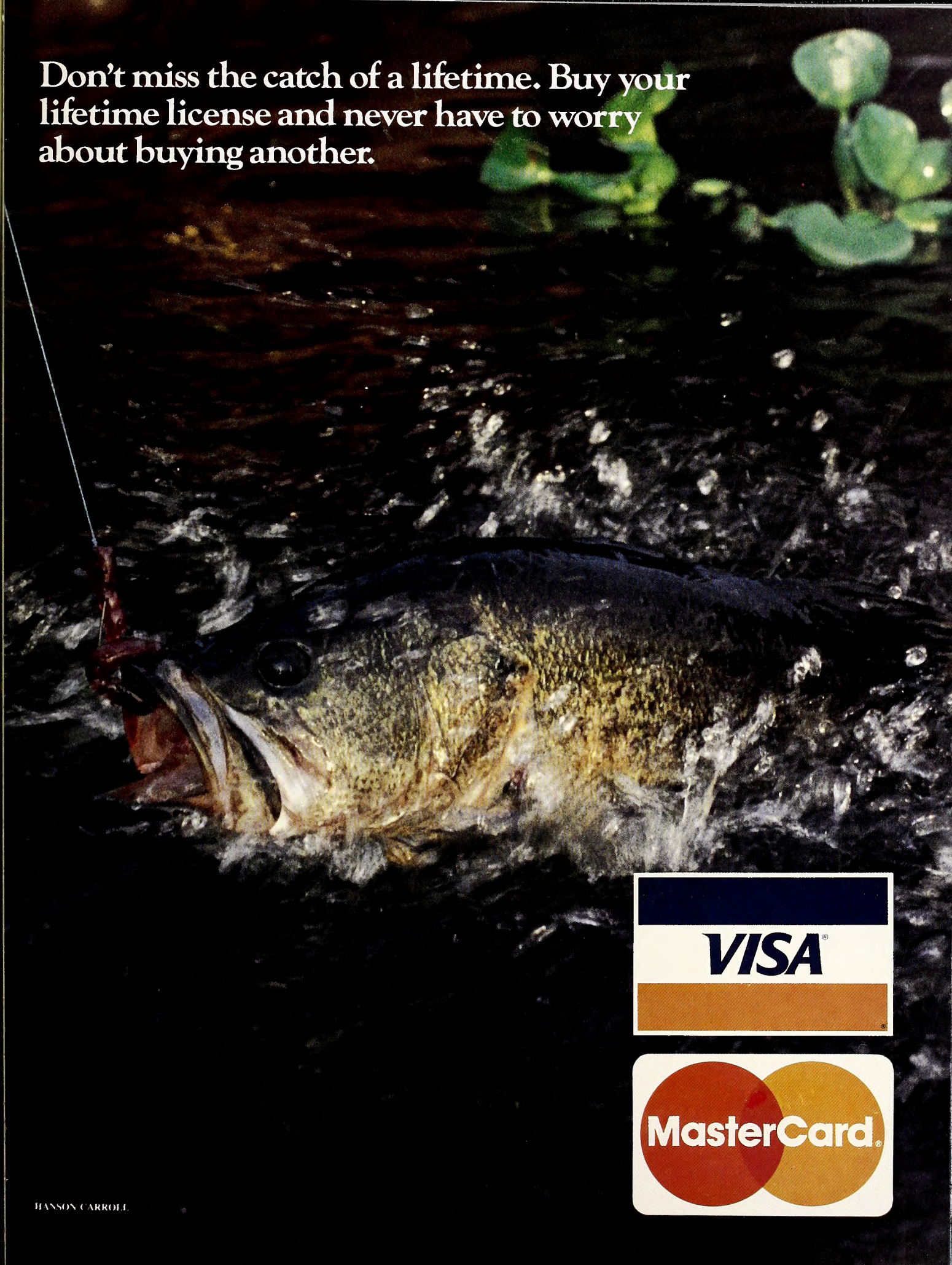
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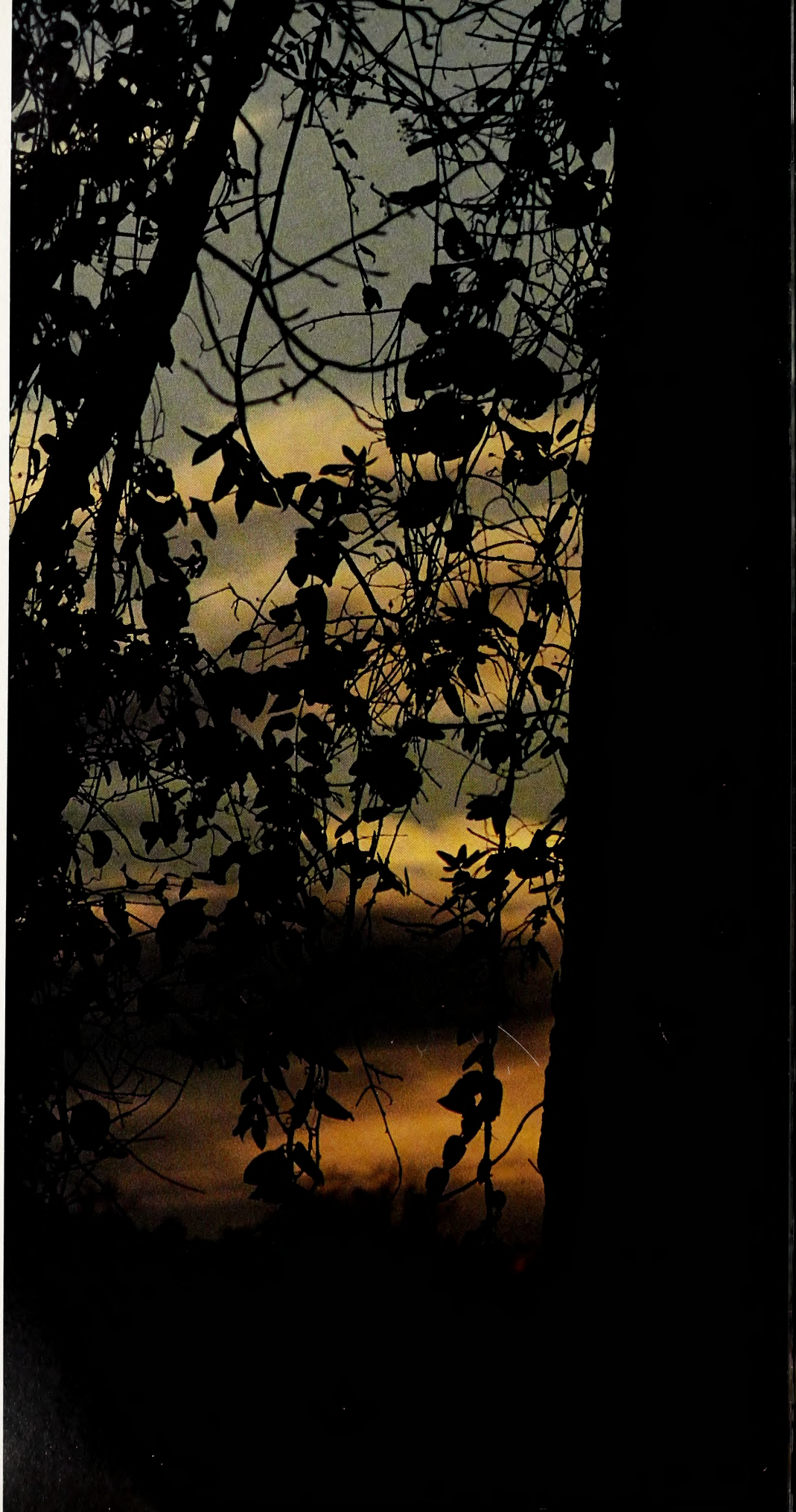

Sunset Vigil

A deer hunter sits in a tree stand waiting for a white-tailed deer to step into an opening somewhere below.

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WILDLIFE IN NORTH CAROLINA

OCTOBER, 1987 75 CENTS

There's Something Out There

by Jim Dean

The sun had long since dipped below the heavily forested ridges of the Great Smoky Mountains National Park by the time five park service employees finished cleaning up the supper dishes. The bunkhouse porch was an inviting spot to prop up bone-weary feet and watch the light fade in the meadows alongside the gravel road and the Cataloochee River. The date was July 23, 1975.

There were deer in the meadow between the road and the river, but something was wrong, and casual conversation soon stopped as the men began to watch more closely. The deer were not browsing placidly as was normal. Their tails twitched, and several times they bolted in unison for short distances. Suddenly, they scattered wildly.

LEONARD LEE RUE III

One of the men left the porch and stood in the road. He was still standing there puzzled by the sudden departure of the deer when a park service truck pulled up. Greetings were exchanged, and the truck proceeded down the road past the meadow where the deer had been. It was nearly dark now, and the red tail lights of the truck were rounding a bend when a large animal cleared the road behind the truck in a single leap. All five men saw it, saw the long, thick curling tail that seemed as long as the animal itself, and the distinct silhouette of a creature long described in the Appalachians as a panther, mountain lion or cougar.

But was it really the big cat so closely associated in life and legend with these ancient mountains? These animals were once native here, and place names sustain that vivid memory. There are Panther — or "Painter" — creeks, ridges and hollows all associated with this big cat. The native Eastern cougar, however, has been considered extinct for over a century, and until that July evening in the Cataloochee Valley, there had been only occasional unsupported reports of sightings.

What made this incident different was that five men verified the sighting, and the Park Service gave it enough validity to report it in a news release. Not surprisingly, it created a stir, and led to speculation that the native cougar might not be extinct in the Southeast after all.

Throughout the dozen years since that incident, reports continued, not only in the mountains, but also in the foothills and Coastal Plain. At one time, the State Museum of Natural History had recorded nearly 500 sightings, many obviously fabricated, but some from apparently reliable sources. A few hair samples were collected, and a few questionable tracks were found, but solid evidence proved elusive and biologists remained skeptical.

One reason is that of the 11 subspecies of cougars once native to North America, only two were ever native east of the Mississippi River — the Florida cougar and the Eastern cougar. Biologists have determined that a remnant population of Florida cougars still exists in the Everglades, although estimates indicate its total population may number only about 30 animals. Could these cougars have spread to North Carolina? Not likely. The remnant population of Florida cougars is too small and too isolated.

But what about the Eastern cougar? Could a remnant population of these secretive animals also have persisted in remote areas? It seems clear that there is something out there.

Finally, this past March, the killing of two cougars in Tyrrell County provided some hard evidence, and it supports what biologists have been saying. Checked carefully by taxonomic experts, the two Tyrrell County cougars were found to be neither Florida cougars nor Eastern cougars (one had a number tattooed in its ear). Indeed, biologists believe they may be western cougars that either escaped from captivity or — more likely — were released by an owner who lived somewhere in the East.

There are more cougars in private captivity in the East than most people realize, and not always legally. They may or may not get good care, but it's doubtful that many escape. You also have to wonder about the kind of owner who would use a cougar to make a fashion statement (elegantly-dressed women have been seen walking cougars on leashes in Central Park). More to the point, how does the owner of a pet cougar dispose of it when it becomes evident that this is not just an oversized Garfield? Zoos seldom take such animals.

It is not therefore difficult to figure out how two cougars might find themselves suddenly freed in a lightly populated part of Tyrrell County. Unauthorized releases are also the most likely explanation for all other cougar sightings in the Southeast (except Florida) in this century.

No doubt there are at least a few released cougars running free in remote areas even though animals raised in captivity seldom have the instincts to survive for long. Whether they could also have established a breeding population in some areas is doubtful, but perhaps not beyond possibility. At any rate, all are protected by law.

As for the native Eastern cougar that originally stalked this land, it seems likely that the experts have been right all along. Sad to say, it is almost certainly extinct.

N. C. DOCUMENTS

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Back Of The Book *by Mark Taylor*

Cover *The crests of the Smokies are home for this white-tailed buck, captured on film by Ken Taylor. No, the deer did not linger to see the photograph.*

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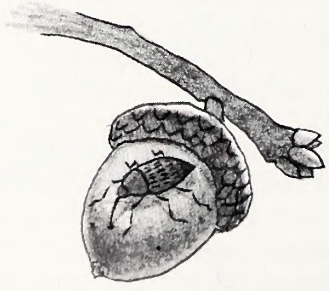
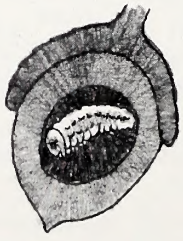
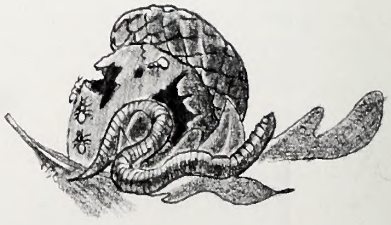
Last to lose *their leaves in autumn, oaks are also last to reflag in spring. Many other natural processes are finding their fruition on a fall oak tree, although we have to look sharp to see them.*



An oak can *produce 5,000 acorns a year, although the crop varies from year to year. Some acorns provide homes for the tiny acorn weevil. In spring, adult weevils drill holes through the acorn shell to lay their eggs.*



The larvae eat *the acorn throughout the summer. When the acorn falls, the maggots exit and burrow in the ground for one or more winters before they emerge as adult weevils.*



Other animals use *the hollowed-out acorn husk, including acorn moths, centipedes, ants and earthworms. Gradually they reduce the acorn to pieces.*

Autumn Oak Watching

written by Lawrence S. Earley / illustrated by David Williams

As autumn progresses, our eyes feast on the painted spectacle of hardwood trees changing color. The oak is a lackluster exception, of course, yet there is more than colorful pageantry in summer's going, as a close look at the oak may make clear.

That old oak in your yard may be carrying several hundred thousand leaves, and when they are all waving in a midsummer breeze the effect is not unlike a tall ship under sail. Linked to the root tips by an unbroken column of water within the tree trunk, each summer leaf emits a cooling water vapor through the pores, or stomata, on the underside of the leaf — up to 35,000 of them per square inch!

Of course at this time of year the oak, like other trees, is shutting down its waterworks. Soon its leaves will fall, preventing further water loss. Oaks keep their leaves longer than other trees, however. Most trees form a corky layer of cells between the leaf and the stem in the fall, a weak link easily broken by breezes. But the oak, and the beech, lack these cells and so they wear their foliage longer. And when the leaves finally fall they will decay more slowly than others. This is because they are full of tannin which is apparently distasteful to earthworms, microbes and other decay organisms.

Now is the time to look for insect galls on your oak tree. These are growths that come in a variety of forms — twig swellings, deformed buds or leaf blisters. One of the most interesting galls is a round, spongy fruit an inch or two in diameter called an oak apple. By irritating the tender tissues of an oak leaf or branch last spring, insects — mostly small wasps — fooled the tree into growing the "apple" instead of a leaf. The wasps use galls to feed and shelter their young. Some wasps emerge in the spring, but others, apparently all females that lay eggs without fertilization, leave the gall only in the fall.

How is your acorn "crop"? Oaks begin to drop their acorns in September and the harvest lasts about a month. The number of acorns produced varies from year to year for reasons not completely understood. In an average year, the tree may produce 5,000 acorns; it may double or triple that amount in a bumper year. Though the acorns are "intended" as seeds of future oaks, less than one percent of them will sprout and most of these seedlings will die. By far, the biggest use of acorns is food — 49 species of birds and animals eat acorns.

A substantial number of acorns provide homes for insects. Indeed, acorns are a necessary link in the life cycle of the quarter-inch acorn weevil and the acorn moth. Examine a fallen acorn in your yard. A tiny hole in the shell may signal the exit hole of a weevil which has eaten the acorn hollow. In the spring, an adult weevil bored into the acorn with its long snout and laid its egg. After hatching, the larva fed on the nut and remained inside until the fall when the acorn dropped to the ground. Then it drilled an exit hole and burrowed in the soil where it will spend a winter or two.

When the weevil larva leaves the acorn, the acorn moth may move its young in. After the egg is laid, the moth larva will winter in the nut feeding on whatever wasn't eaten by the weevil.

Many natural processes are finding their fruition on the oak tree at this time of year, but we have to look sharp to see them.

***Apple galls are** are spongy growths found on oak leaves, twigs or branches. Wasps "fool" the tree into growing the gall to feed and shelter their young.*

Wildlife In North Carolina Becomes A Book

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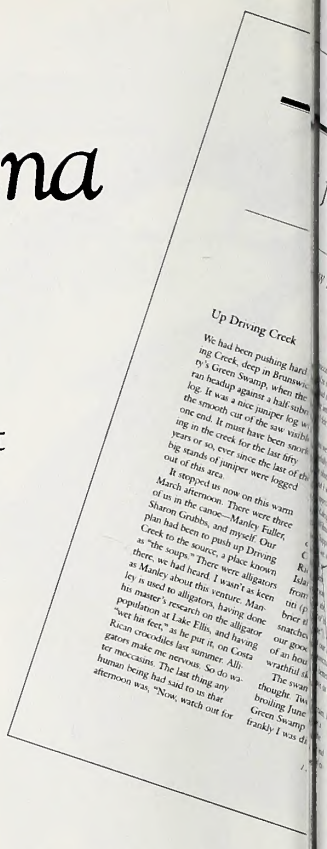

Up Driving Creek

We had been pushing hard ing Creek, deep in Brunswi ry's Green Swamp, when the ran headup against a half-sunk log. It was a nice juniper log, w the smooth cut of the saw visibl one end. It must have been smooth ing in the creek for the last fifty years or so, ever since the last of th big stands of juniper were logged out of this area.

It stopped us now on this warm March afternoon. There were three of us in the canoe—Manley Fuller, Sharon Grubbs, and myself. Our plan had been to push up Driving Creek to the source, a place known as "the soups." There were alligators there, we had heard. I wasn't as keen as Manley about this venture. Manley is used to alligators, having done his master's research on the alligator population at Lake Ellis, and having seen his feet, as he put it, on Costa Rican crocodiles last summer. Alligators make me nervous. So do water moccasins. The last thing any human being had said to us that afternoon was, "Now, watch out for

by Lawrence S. Earley

"Why didn't we just publish a photo collection?" asked Jim Dean.

I opened my mouth, but Jim was already answering his own question. "I know. Because we want people to read about North Carolina, not just look at photographs." He looked down at the table laden with oversized Xeroxed sheets and shook his head. "It might have been a lot easier if we had stuck to photos," he said.

The scene was the conference room of the Wildlife Resources Commission on the third floor of the Archdale Building in Raleigh. The two of us, both editors of *Wildlife in North Carolina* magazine — the official publication of the agency — were looking at the blood, sweat and tears of years of work. Spread over every inch of the horseshoe-shaped table were stacks of articles that had appeared in the magazine over its 50-year lifespan. We were about to begin one of the hardest jobs we had ever done — choosing the contents of our first published book.

This month, in book stores all over the state, you can judge for yourself the results of our efforts. *Wildlife in North Carolina* — the book! — is a reality. It's a handsomely printed, 225-page collection of articles, color photographs — 150 of them — and artwork that have appeared in the pages of the magazine over the years. Published by The University of North Carolina Press and sold for a modest $24.95, it's more than we hoped for.

It started out as a gleam in our eye several years ago. "Let's do a book," one of us had said one morning over coffee. These kinds of brainstorms are common under the influence of caffein. Some of our best article ideas have come that way.

"Why a book?" asked another.

Various reasons were offered. "A lot of readers have suggested that we publish a book so they could reread favorite articles," someone said. "Our fiftieth anniversary is also coming up," another pointed out. "Why not celebrate it with a collection of memorable articles from the magazine's pages?"

Someone else noted that a book was more permanent than a magazine, especially one that was as well-used as ours. Children cut out pictures for school projects. Dads framed other pictures. After the family got through with an issue of the magazine, it was often in no shape to be saved.

We could see it in our mind's eye — a book with lots of photographs and interesting stories. It would be enjoyable to read and fun to look at. It would also be a book unlike any other, a book that would tell a new story — of North Carolina's wildlife, its natural ecosystems and its sporting heritage.

There was some initial skepticism. Were there enough first-class articles to fill a book? All of us had our favorites, articles that we had enjoyed editing and rereading. We named some that popped into our minds. How about Jane Rohling's piece on hummingbirds? Or Terry Shankle's on Stone Mountain? Jim thought that Joel Arrington's article on blue fish and Doug Elliott's feature on old-time apples were among the best he remembered. These were only a few, and they had appeared within the last 10 years. Surely there were lots more.

We broached the subject to David Perry, an acquisitions editor at the University of North Carolina Press in Chapel Hill. He became an immediate and enthusiastic ally. "The magazine is widely read," he said, "and a book would be very popular. And what a great way to celebrate your 50th anniversary!" Together we arrived at a suitable format at an affordable price. We were ready. All we needed to do was to choose the "top 50."

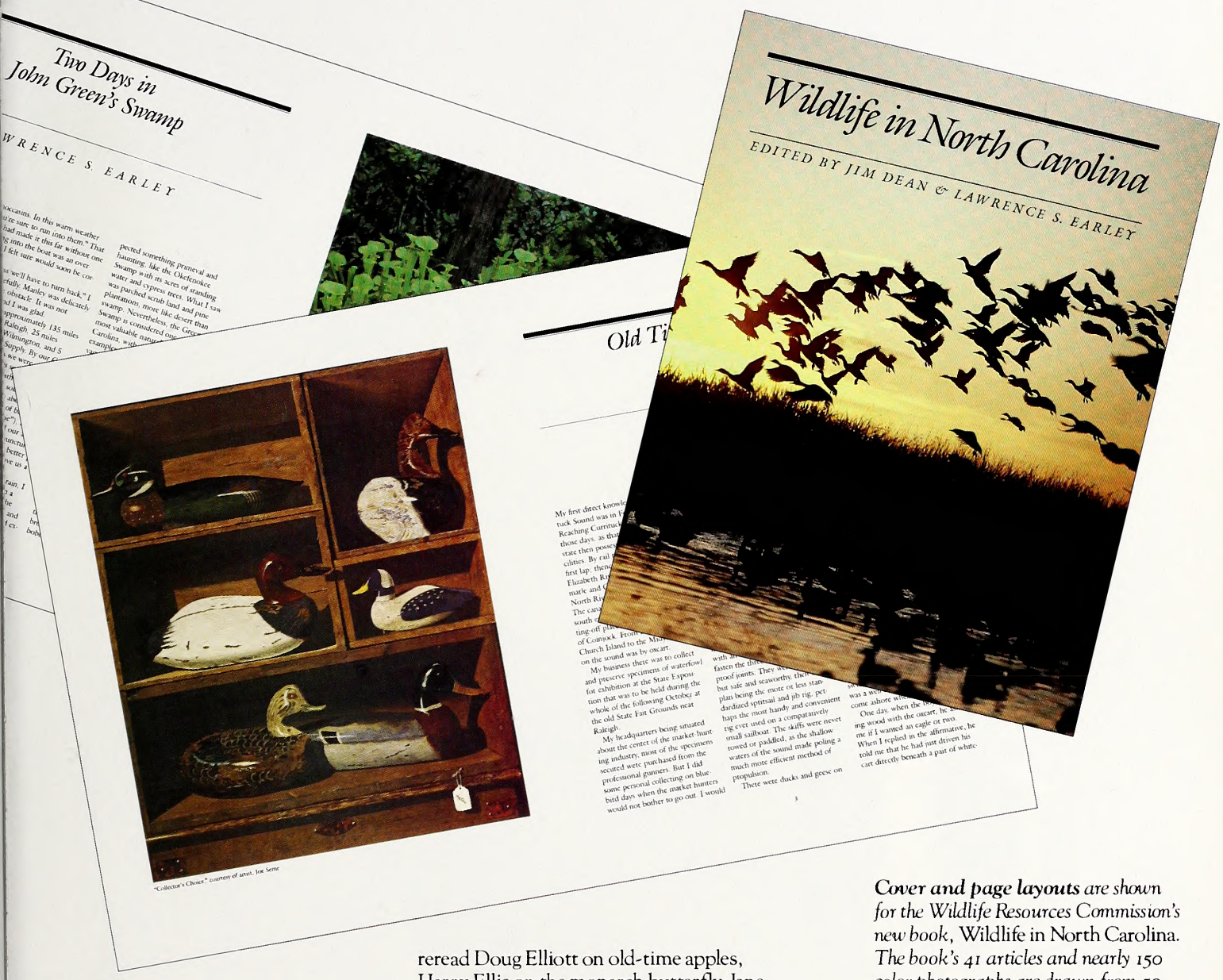
That's where we were that August afternoon in 1986. We had already completed a formidable task of selection, winnowing the thousands of articles that had appeared since 1937 down to the stacks in front of us. Slightly over 100 stories had met our three criteria: to be entertaining; to say something interesting about the state's natural or sporting history; and to have good color photography. By design, most of the articles came from the last 10 years of the magazine, when color photographs accompanied most articles. But we had many gems from the earlier years as well.

That afternoon we began the bloodletting. At least that's what it felt like to go through 100-plus articles and reduce them by half. We stalked about the room like a couple of nervous cats.

"How can we not choose this one?" Jim groaned as he held up an article we both liked.

"There's no way we can leave that one out," I groused as Jim cast what I thought was a cold eye on another.

Before long, it was clear to us that not only did we have enough material for one book, but we could probably fill a second. As we prowled the perimeter of the horseshoe-shaped table, we became more ruthless, rejecting one because of a minor fault, another because the photographs weren't quite up to our usual standard. Others fell by the wayside because they failed to fit into the book's organization



***Cover and page layouts** are shown for the Wildlife Resources Commission's new book,* Wildlife in North Carolina. *The book's 41 articles and nearly 150 color photographs are drawn from 50 years of* Wildlife in North Carolina *magazine.*

plan. And so it went for the rest of the day until, our spirits dragging, feeling as if we were disinheriting our own children, we had our quota.

And when David Perry asked us weeks later to reduce that number to 41, it was easy. When you've already amputated a leg, removing a few fingers isn't very hard to do.

Wildlife in North Carolina — the book — is the fruit of our labor that day and throughout the months that followed. In the first of its four sections, called "Sporting Heritage," H.H. Brimley describes the old days on Currituck Sound. James Lewis's article on North Carolina waterfowl decoys and their makers makes a stunning impact with a layout of 30 collectors' decoys. There are articles on Plott hounds, on traditional boats and on Currituck's historic waterfowl clubs.

In part two, "Flora and Fauna," you'll reread Doug Elliott on old-time apples, Harry Ellis on the monarch butterfly, Jane Rohling on hummingbirds as well as others. Part three, "Special Places," brings you to some of the wild and wonderful natural areas in the state — the Green Swamp, Nags Head Woods, the French Broad River and others. In part four, "Hunting and Fishing," readers can hunt whitetails with Charles Elliott, go on that perfect bird hunt with Mike Gaddis, and gig flounder with Curtis Wooten.

Special inserts of some of Jim Dean's "Natural Heritage" essays are found throughout the book. And everywhere, of course, are the photographs of Ken Taylor, Jack Dermid and more than a dozen other talented photographers.

Wildlife in North Carolina — our 50th anniversary book — is a gift from the Wildlife Resources Commission to you, our readers who have been so loyal to us over the years. We hope it will have a permanent place on your bookshelf or coffee table, to be read and reread often. We think you'll agree, it's a book for this holiday season; it's a book for all seasons. ⊠

Wildlife in North Carolina is available in bookstores statewide, or readers may order it directly from the University of North Carolina Press. Use the special form on the bind-in page at the rear of the magazine. Fill in your name and address, enclose $24.95 with tax and shipping fees, and send check and form directly to the Press.

WILLIAM S. LEA

Whopper Whitetails

What grows a massive rack of antlers on a buck white-tailed deer, and what can deer hunters do to increase the numbers of such trophies?

by Terry Shankle

Every deer hunter dreams of bagging a trophy buck. The term trophy, however, has different meanings for different hunters. To the youngster on his first hunt, any deer might be a trophy. To the seasoned veteran, a trophy may be nothing less than one for the record books.

Most deer hunters ponder trophy racks year-round. They imagine trophy bucks approaching their stands, appearing suddenly like an apparition to reward the many hours spent in motionless solitude. Naturally, the hunter's imagination also usually conjurs a massive set of antlers — at least 10 points — and why not? Hey, it's your daydream.

But is there really a 10-point buck with a 20-inch inside spread and 10-inch tines roaming the woods you hunt in North Carolina? If there isn't, is there anything you, as a hunter, can do to increase the chances that a wallhanger will be roaming your hunting grounds?

"That's a question with many variables," says wildlife biologist Scott Osborne. "But the best quick answer is this. Yes, deer hunters in most areas of North Carolina can have some effect on the number and size of trophy deer in the areas they hunt."

Osborne, who lives in Sanford, has been the Wildlife Commission's Deer Project Leader for approximately five years. During that time, and earlier as a district biologist in an area with a high deer population, he has had the opportunity to closely observe North Carolina's deer population. Those observations, along with knowledge gained through contacts with deer specialists from other states, have caused him to develop some ideas that could help increase your chances of bagging a bragging-sized buck in North Carolina.

"Quality deer management is the best overall way to increase the number of trophy deer in an area," says Osborne. "By quality, I mean a herd with well-balanced, adult sex ratios, good fat condition levels year-round, and high recruitment (birth rate and survival)."

"Balanced adult sex ratios are achieved by harvesting the same number of does and bucks, a 50/50 ratio, to keep populations constant from year to year," said Osborne. "A well-balanced population will be healthier because the deer will not overeat the preferred foods in their habitat. This will

***Standing in a** western North Carolina field, this buck symbolizes all that is wild. Antler size depends on the age of the buck but also his habitat and his nutrition.*

Whopper Whitetails

increase fat levels and lower parasite counts so that deer will survive the harder times of the year in better condition. Healthy adult deer that are in better shape produce greater numbers of healthy fawns that grow to be adults.

"Once a quality deer herd is established, the best way to increase the number of bucks with higher weights and nicer antlers is to let more 1½-year old bucks survive to be 2½ years old or older," says Osborne.

Osborne offers some impressive facts to back up his statement that older bucks are finer bucks. Statistics gathered from actual kills of Piedmont deer in 1985 show that if bucks are allowed to reach 2½ years of age, their weights increase an average of 19 percent, or from an average of 115 to 137 pounds. Their number of antler points increases approximately 60 percent, from 4.2 points to 6.7. Finally, the average spread of their antlers increases 48 percent, from 8.4 inches to 12.4.

"And the numbers continue to increase as bucks reach 3½ years old, 4½ years old, and older," says Osborne. "Most research indicates that bucks do not peak in antler quality until they are 5 or 6 years old. The problem is that 69 percent of the bucks harvested in 1985 were button bucks and yearlings. Hunters in North Carolina severely limit their potential to harvest trophies when 70 percent of the bucks are killed before they are 2½ years old. To harvest more trophy-size bucks we need to reduce the harvest on younger bucks and allow them to reach trophy age.

"Habitat quality and genetic characteristics also enter into the picture, and these combine with age to form the three major factors that control the number and size of trophy bucks in a herd."

Records show that better antlered deer come from areas with better soils, diversity in crops, managed wood lots, and mature hardwoods. That's why most of the bucks in the record books come from the Ohio River Valley region, the Midwest, and the Great Lakes states where soils are of higher quality, making the vegetation higher in food value. Food supply, and more important, the quality of that food as determined by the soil, can cause genetically superior deer to not reach their growth potential.

The red clay soils and sand in most areas of North Carolina simply aren't conducive to growing the type of quality vegetation needed by buck deer to grow extremely large antlers. Calcium and phosphorous are the primary minerals that grow antlers, and our soils have little of either. This is a fact we must live with. Even intensive and costly soil manipulations cannot greatly alter the soil types we have in the state.

Genetic characteristics are also a factor, but for the average deer manager or landowner, there are few management techniques that can be implemented that will greatly alter genetic characteristics.

"Wildlife biologists are constantly asked why we don't bring in and release 'big buck' deer from other parts of the United States," said Osborne. "Some hunters believe this would stop so-called inbreeding while also increasing antler size.

"Inbreeding, however, has rarely been shown to be a problem in deer, and there are very few areas in the Southeast where inbreeding has been documented. Characteristically, deer are out-breeders, which means they traditionally breed away from deer that are closely related."

Osborne also explains that because of the soil types found in North Carolina, transplanted deer would probably not grow antlers as large as they might in their native territory. Most important, it would take

EUGENE HESTER

During the rut, *bucks use their antlers to engage in contests of strength to establish dominance. Many observers believe that antlers serve as a display, not a weapon.*

TERRY SHANKLE

Wildlife biologists *Mike Seamster (left) and Harlan Hall (right) score a buck's rack for members of the McLeansville Wildlife Club in Guilford County.*

Biologists say that *hunters can help produce trophy-sized deer by passing up small bucks. Antlers require a lot of nourishment, and only deer that have reached their optimum development have nourishment to spare for their antlers.*

enormous numbers of transplanted deer to have an effect, if any, on North Carolina's herds because the population is already so high. The transplanted deer traits would quickly be diluted by the large herds here now.

Finally, such a project would be extremely expensive because it's very difficult to trap older, more mature bucks.

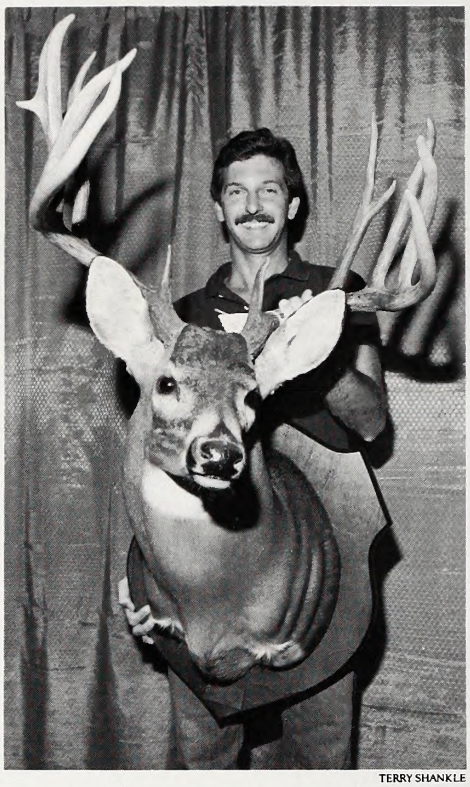
In recent years Georgia has produced several deer that have scored high enough to be placed into the Boone and Crockett Club record book. Given the fact that Georgia's soil types are similar to North Carolina's, the question has been raised, "Why do they have more trophy size deer than we do?"

"One hypothesis," says Scott Osborne, "is that when Georgia rebuilt its herds in the 1950s and 1960s, many deer from various states were used. This was done at a time when native herds were very small, so the transplants had much more genetic impact. Given our soils and our already large herds, the best way to increase the harvest of trophy deer in North Carolina is to let the younger deer survive to an older age."

But is it feasible to ask North Carolina's deer hunters to reduce the harvest rates of younger bucks in the herd in order to increase the percentage of older bucks in the harvest in future years? That would, in effect, be like putting young bucks in the bank to accumulate a little interest. It depends, of course, on the majority of North Carolina's deer hunters. Do they want to harvest any buck or do they want to harvest a trophy buck? Surveys have shown that most deer hunters in North Carolina — despite their daydreams — are interested in shooting any buck, and unlikely to pass up a young buck for the chance that he'll survive to give them a later chance at a trophy.

Combine this with the small acreage ownership of land in some of our best deer habitats, and it's easy to see why our percentage of 1½-year-old-buck kills is so high. Furthermore, a buck deer in most counties crosses many property lines, so while one hunter or club may be trying to restrict the kill of young bucks, the surrounding hunters may not. Therefore, the kill of young bucks remains near 70 percent.

Control of large acreages is a definite asset to quality deer management. If a club or clubs will join together, control access, and use good management practices — good timber management, prescribed burning, special plantings, 50/50 buck-versus-doe hunting, and restrictive shooting of younger bucks — the larger bucks will begin to appear rather quickly. Such projects, though, should be entered into on a long term basis.



TERRY SHANKLE

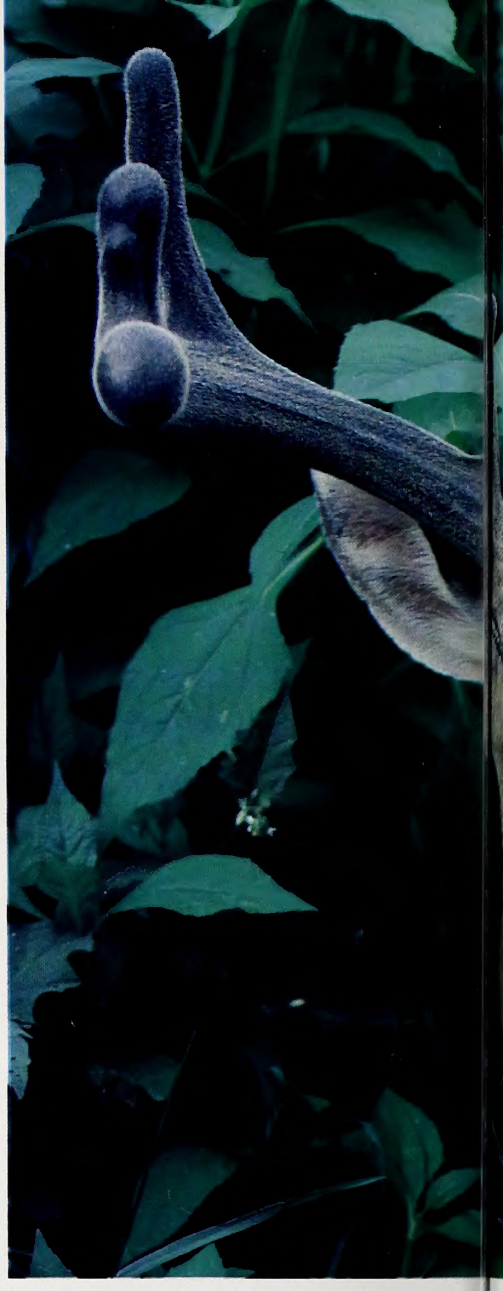
***Dudley Barnes** of Oxford shows off North Carolina's first Boone and Crockett whitetail. The rack scored 172⅛ points in the "typical" class. The buck was shot in Granville County in December 1985.*

"There are trophy deer in North Carolina because many are killed each year," said Osborne, "but many more would be available if more bucks were allowed to reach their potential, which can only be done by manipulating the harvest."

Some people question whether trophy deer should be harvested at all. Rather, shouldn't the trophy deer be left to breed longer? However, since deer are outbreeders, and dominant bucks breed more often, it's most likely that a buck with trophy potential has already spread quite a few of his genes around before he's actually grown that Boone and Crockett rack.

From all this, it may sound as if we have very few trophy deer in North Carolina. That is not the case, and if you have any doubt, visit the Dixie Deer Classic held each winter at the North Carolina State Fair Grounds, and sponsored by the Wake County Wildlife Club. Allen Basala, a member of the club, has been keeping track of the records gathered from the hundreds of deer entered in the judging over the past six years.

"We're constantly in search of North Carolina's finest whitetail," says Basala. "That's the theme of the Dixie Deer Classic, and has been since its beginning in 1981. We look at deer from other states, but our main emphasis is on deer from North Carolina. We score deer entered in the Dixie Deer Classic by the same methods used to score for the Boone and Crockett record book, but our minimum scores are less than theirs. The minimum score for a typical whitetail buck in their book is 170 points. For inclusion in our book, a typical rack must score a



***After antlers are** fully developed, usually by August, bucks rub off the velvet. They polish their antlers by rubbing them against young saplings.*

EUGENE HESTER

Lengthening daylight *in late winter triggers antler growth. Developing antlers are covered by a velvetlike skin that contains many blood veins.*

KEN TAYLOR

minimum of 119 points. The same formula is used for non-typical deer and results in a 136½ minimum."

The second printing of the Classic's record book for North Carolina deer has just been completed and it lists 1,252 bucks. More important, it lists North Carolina's first official Boone and Crockett whitetail, a trophy taken in Granville County in December 1985 by Dudley Barnes of Oxford. It scored 172⅛ typical.

"One of the main purposes of the Dixie Deer Classic is education," said Basala. "The Wake County Wildlife Club also believes that better-educated sportsmen will do a better job of helping to manage resources. We invite experts in their field to conduct seminars at the Classic. Sure, some of them make their living conducting seminars and selling certain products, but their knowledge of deer and deer habits is enormous, and many hunters want to tap into that knowledge. But the statistics that we gather each year may, in the long run, be the most important benefit. This information will be of use, not only to deer hunters, but also to the Wildlife Resources Commission. We use the statistics to develop maps showing the areas of the state that continually produce trophy bucks, and knowing the types of habitat in those areas and the hunting habits of the hunters will surely add to the information available to our professional wildlife managers."

The Dixie Deer Classic has quickly outgrown the space provided in the Scott Building at the fair grounds, and is now held in the Graham Building, which is much larger. The 1988 Classic will also expand to three days, and will include hunter safety instruction. Still, the main attraction will be the trophy heads on display.

It's no big secret that several Piedmont North Carolina counties produce the most trophy deer. But this fact, coupled with current management practices, seems to confirm that beginning either-sex hunting early during the expansion of a deer herd is proper management. This leads to a quality herd which has the potential to produce bigger bucks with larger racks, but only if hunters restrict the harvest of young bucks while increasing the doe harvest.

At any rate, it seems clear that deer hunters and their preferences will continue to play a major role in the quality of North Carolina's deer hunting. ⊠

Birthday Party At

Ducks Unlimited was born 50 years ago, and Mackay's Island played a key role. Fittingly, this is the site of the state's first MARSH project to restore waterfowl habitat.

by Curtis Wooten
photography by Glenn D. Chambers

In the sultry morning heat on August 15, 1987, a group of conservationists from across the state, along with elected representatives, members of the N.C. Wildlife Resources Commission and the U.S. Fish and Wildlife Service gathered on a dike in a salt marsh on Mackay's Island National Wildlife Refuge. Their purpose: the dedication of the first of what is hoped to be many projects to preserve and enhance wetland habitats for waterfowl and other wildlife. These projects will be joint ventures between wildlife conservation agencies in North Carolina and Ducks Unlimited, Inc.

Fifty years earlier, in January 1937, it's likely that another group of men gathered on that same marsh, shotguns in hand and eyes scanning low-slung, leaden skies for incoming mallards and teal. One of those men was, undoubtedly, Joseph Knapp, a New York publishing magnate, philanthropist and sportsman who owned the island and had a residence there.

Knapp had been introduced to the Currituck area in 1916 by friends who were members of duck clubs there. He subsequently purchased the island, erected a clubhouse

***Ducks soar into** the sky from a Carolina bottomland. The conservation of waterfowl habitat has long been the single aim of Ducks Unlimited, an organization of sportsmen and other conservationists. The group is celebrating its 50th anniversary.*

Mackay's Island

and, for nearly 30 years, spent a portion of each winter there — intrigued by the closeness of waterfowl, the expansive marshes, and the pleasures of days afield in duck blinds with friends. It was Knapp who was the key figure in the development of the Ducks Unlimited organization 50 years ago, and many of the conservationists in the dedication crowd back in August were DU members, paying tribute, of sorts, to the organization's founder.

In January 1937, the country was still recovering from the Depression and nearly 10 years of severe drought. In retrospect, it seems an odd time to launch an organization whose purpose was "to raise funds for the preservation, restoration and maintenance of wetland habitat on the North American continent." But hard times have a way of clarifying issues and goading men to action.

Though Ducks Unlimited was formally incorporated in January 1937, it had been in the making for a decade. As early as the mid-1920s Knapp knew that all was not right on the marshes. Waterfowl were no longer as numerous as they had been, and when the 1929 drought further decimated duck populations, he knew that something had to be done. In 1930, he and two associates incorporated in North Carolina the More Game Birds in America Foundation "for the purpose of receiving and maintaining a fund . . . for the purpose of increasing the number of game birds and other game, fish, or wildlife in America . . . ."

The Foundation was nothing short of evangelical in advancing its theories of game-bird propagation and management. In its roughly eight years of existence, it published at least 12 booklets on game birds and game-bird breeding, one of which, "More Waterfowl by Assisting Nature," was almost prophetic in its analysis of the problems facing waterfowl and its proposed solutions to those problems. Published in August 1931, the booklet stated ". . . it is not what man does but what he does not do for migratory waterfowl which is chiefly responsible for diminishing numbers. What is urgently needed is a program which will take no account of international boundaries, but will bring neighbor nations of the North American continent into harmonious accord for the good of the game."

Today, we might dispute the notion that "it is not what man does" that has a detrimental effect on waterfowl, but the booklet's identification of the need for international cooperation to benefit migratory waterfowl, and other wildlife, was right on target.

Ironically, it was its own ambitious survey of waterfowl-breeding populations on the U.S. and Canadian prairies in 1935 that brought about the demise of the More Game Birds Foundation. That survey, using advanced techniques of ground and aerial observations, revealed that 70 percent or more of the migratory ducks and geese that grace U.S. skies and marshes in the fall and winter are actually hatched and reared in Canada. With this new information, the directors of More Game Birds realized that to forestall successfully the decline in waterfowl numbers, conservation efforts had to be directed to where the majority of the birds were hatched — in Canada. It quickly became obvious that the problems would have to be addressed by private effort, for governmental dollars were scarce and governmental agencies were prohibited by law from expending tax monies outside the country.

In 1936, the directors of More Game Birds decided to form a new organization which would raise funds from U.S. sportsmen to preserve and restore waterfowl nesting habitats in Canada. The More Game Birds for America Foundation would be dissolved and all its assets transferred to the new organization.

It was initially proposed that the new organization be known simply as "Ducks," but during an early planning session in 1936, Arthur Bartley, who was to become the first executive director of the new organization, noted that it was customary for corporations in Canada to have their name followed by "Ltd.," thus "Ducks" would become "Ducks, Limited." It is reported that Joseph Knapp, who coined the "Ducks," exploded at the prospects of the variation, jumping to his feet and exclaiming "We don't want *limited* ducks!"

"All right, then "Ducks *Un*limited," Bartley is said to have replied.

"That's it," countered Knapp. And so it was!

In the early planning stages, the DU Executive Committee felt that the DU program could be completed within five years. It called for an expenditure in western Canada, the prime nesting grounds, of $600,000 per year, which became a national fund-raising goal in the United States.

Although fund-raising goals were seldom achieved in those early years, and it was 20 years before $600,000 was raised in a single year, significant strides were made. Shortly after incorporation, Ducks Unlimited, Inc., the parent organization, formed Ducks Unlimited Canada north of the border to carry out the actual earthmoving and restoration of wetland projects across the provinces. Work on the restoration of the 100,000-acre Big Grass Marsh in Manitoba was under way by April 1938.

***Canada's waterfowl** nesting grounds have traditionally been the focus of Ducks Unlimited's habitat-preservation efforts. Today, the organization is sponsoring programs to protect wintering habitat in Mexico and the United States, including North Carolina.*

Since those early days, DU has built more than 3,000 wetland projects involving nearly 2 million acres in Canada, providing waterfowl and other wildlife with over 16,000 miles of protective shoreline for nesting and rearing of young. It holds another 2 million Canadian acres in reserve, protecting them from deterioration while they await improvements. "Improvements" may include constructing dams, levies, dikes, or water-control structures to protect against drought and flooding; constructing nesting islands to protect nesting birds against predators; and altering water levels to produce desirable food plants.

Though successful in its fund-raising, DU has resisted pressure to get involved in legislative battles, research, or education. Its directors have held steadfastly to its "singleness of purpose" — to put the resources it

generates directly into habitat preservation and enhancement. If that battle were lost, they believe, all other arguments would be moot.

For the first 37 years of its existence, all of DU's efforts centered on Canadian wetlands, where 70 percent of the continent's waterfowl were reared. But in the 1970s, concern mounted over a new quarter — Mexico. This ancient wintering ground for millions of waterfowl was facing its own severe habitat problems. Realizing that winter habitat was as important as summer habitat, DU in 1974 began a program to preserve and enhance Mexican wetlands, giving rise to Ducks Unlimited de Mexico. Since that affiliate organization was formed, some 58 projects involving over 92,000 acres have been completed and over 400,000 acres are being held in reserve there.

For decades DU directors recognized that the "pothole" region of the north-central United States and Alaska was nearly as important to continental waterfowl production as were Canadian wetlands. The U.S. Fish and Wildlife Service and state conservation agencies, holders of vast acreages of wetlands, lacked funding to develop their holdings for maximum waterfowl production. In 1984 DU was asked to expand its Canadian and Mexican programs to assist with the enhancement of wetlands in North and South Dakota, Minnesota, Montana, and Alaska, the five states where 90 percent of U.S. waterfowl production occurs. Thus, in 1984 the North American Waterfowl Management Program was born. In the past three years, since that program was initiated, some 95 projects involving over 136,000 acres have been completed.

At that same time, DU began a liaison with the National Aeronautic and Space Administration (NASA) to use data from the thematic mapper of the LANDSAT 5 satellite to inventory and classify 60 million wetland acres in the central U.S. and Canada. That effort is now providing biologists from DU and cooperating agencies with definitive data for the first time on the quantity and quality of remaining wetlands in the survey areas.

In 1985, further expanding its U.S. programs, DU began MARSH — Matching Aid to Restore States Habitat. This program provides financial support to state wildlife agencies for the preservation and enhancement of wetlands important as wintering habitat for migratory waterfowl and the production of local nesting species such as the wood duck.

Since 1985, DU has given to the state of North Carolina, through the Wildlife Resources Commission, $374,870 on a 2-to-1 matching basis for wetlands-conservation efforts in our state. Some $15,000 of that is being used to help replace a structure used to control water levels on a 200-acre marsh on Mackay Island National Wildlife Refuge — the project dedicated back in August. Another $450,000 has been committed to the $2 million purchase price of a 3,000-acre tract of bottomland-hardwood habitat known as Conine Island, located on the Roanoke River near Williamston. The purchase of that property, to be turned over to the Wildlife Resources Commission for management, is a joint effort of Ducks Unlimited, the Nature Conservancy, and the North Carolina Wildlife Resources Foundation.

Through its MARSH program, DU expects to return to North Carolina at least $140,000 every year to help offset the increasingly rapid loss of vital wetland habitats in North Carolina. Similar support is available to all 50 states.

Two hundred years ago, when our nation was undergoing the pangs of birth, it is estimated that there were some 400 million acres of wetland habitat on the North American Continent, and there was an annual fall flight of ducks and geese estimated at 400 million birds.

This fall, best estimates are that some 75 million ducks and geese will migrate south. And of the 400 million acres of wetlands we inherited from our forefathers, less than 200 million remain. Half of our wetland heritage, and all that thrived there, is already gone. And, in his pursuit of "progress," man is now destroying nearly half a million acres each year — 1,200 acres each and every day!

Ducks Unlimited has grown from a fledgling organization of sportsmen 50 years ago to the world's foremost wetland-conservation organization of today. Sportsmen still constitute a significant proportion of its 600,000 members, but increasingly they are being joined by conservationists from all walks of life who recognize the value of wetlands to wildlife.

Ducks Unlimited's 4,005 volunteer committees have set a fund-raising goal of $66.7 million in this, their 50th year, and plan to complete nearly 400 additional projects.

The revenue and acreage figures would undoubtedly impress Joseph Knapp and other DU founders, but the task today is equally immense, and even more urgent than in 1937. If you'd like to help, join Ducks Unlimited! ⊠

Wildflowers of the Waning Year

There is an unmistakable crispness in the air that marks the year's last glorious pageant of wildflowers in our forests and fields.

written and photographed by Harry Ellis

The summer solstice is now many weeks past. Then, around June 22nd, the sun had reached its northernmost point in the sky and stood at midday almost directly overhead, bringing the longest day of the year, with the earliest sunrise and the latest sunset. Now it is slowly veering southward, the days growing shorter. The birds have largely fallen silent, their spring chorus ended, and bees work at a feverish pitch, laying up stores for the coming winter. Almost every green leaf in the forest is pockmarked by insects or seared by heat and disease. Hardly a perfect one can be found. Even in the lingering heat of late summer and early fall, there are unmistakable signs that the year's clock is slowly running down.

The spring wildflowers of our woodlands have bloomed, set their seed and are gone, for on the forest floor, they must, of necessity, rush into blossom and complete their cycle early, before the leafy canopy closes overhead, shutting out the sunlight. But the annual pageant of the wildflowers has not ended. It has only moved out of the dark woods into the green sunlit fields and meadows, where it will continue until the hard frosts of late autumn have come. However, a few species with a greater than average tolerance to shade will still bloom in the dense woodlands.

North Carolina, with the greatest botanical diversity of any other state, has an amazing wealth of wildflowers from the highest mountains to the Coastal Plain. Every month of the growing season brings new tapestries of blooms in colors that span the rainbow. To fully appreciate our wildflower legacy, one must spend a whole season observing from week to week the succession of dis-

White heat aster (Aster ericoides)

plays across the state. Like a revolving floral wheel, they bloom according to a precise and unfailing schedule, each species arriving at its appointed sequence. The goldenrods bloom at about the same time every year, and so do the lilies, the asters and all the rest.

Many of the highest and most beautiful mountain summits in eastern America lie within the boundaries of our state. Some of these are extensive mountain meadows known as grass balds, that in mid and late summer become natural gardens filled with a variety of wildflowers. The dominant ground cover on these balds is mountain oat grass *(Danthonia compressa)* which the wind, seldom still on these mountaintops, rolls into billows and waves like an ocean surf.
Here grows the rare Gray's lily *(Lilium grayi)*. In the summer of 1840, Dr. Asa Gray found it growing on Roan Mountain Bald, and as it was later found to be a new species, it was named in his honor. Its intense scarlet, bell-like flowers are seen during July and August. Another rare and endangered plant of these summits is the Appalachian avens *(Geum radiatum)*, with rounded basal leaves and bright yellow flowers. An interesting plant of the same habitat is the filmy Angelica *(Angelica triquinata)*, bearing greenish flower-clusters with a nectar that is intoxicating to bees and wasps. From observation, I have found that they become totally unable to fly for a period of time after feasting upon it.

The uniqueness and abundance of the southern Appalachian flora has, over the years, drawn botanists from afar to this region. They include the Bartrams, Andre Michaux and his son, Francois, Asa Gray, John Fraser, Thomas Nuttall of Yorkshire, and John Lyon of Scotland, for whom the lovely Lyon's pink turtlehead *(Chelone lyoni)* was named.

Envy has never been a part of my physical or mental make-up, but I *do* envy those men who walked upon our land when it was a fresh floral Eden, before it was despoiled by the arrival of the bulldozers and the sawmills. On the other side of the coin, wildflower enthusiasts of today have within easy reach one of the world's most beautiful highways — the Blue Ridge Parkway, where the natural wildness of the area has been preserved to a remarkable degree. For some 469 miles it winds through green woodlands and mountains adorned with wildflowers, habitats that were once largely inaccessible to most people.

Bee-balm (Monarda didyma)

During the hot, hazy days of late summer, fields and meadows gleam with the gold of yellow hawkweed, golden ragwort, black-eyed Susan and yellow coneflower. Wastelands are brightened with wild rose, scarlet bee-balm, and evening primrose. Along woodland borders there are Turk's-cap and Carolina lilies, false foxglove and the brilliant spikes of fireweed. Growing in the shade of the deep woods are Indian pipes, pinesap and monkshood. Along streams and watercourses are dense stands of orange touch-me-not or jewelweed, blue lobelia, and the flaming torches of Cardinal flower. Throughout the marshlands there are masses of cattails and arrowheads, with fragrant water-lilies floating on the still ponds.

The large and showy purple fringeless orchid *(Habenaria peramoena)* blooms in July and August, at least a month later than its near relative, the purple-fringed orchid. Other late-season orchids are the yellow-fringed orchid, spotted coralroot, downy rattlesnake-plantain, and nodding ladies'-tresses which blooms in October, the last of the year's orchids.

As summer ebbs away into autumn and the first wisps of color creep down the wooded ridges, it is then that our wildflowers put on their most spectacular floral show, as clouds of purple asters, thistles, ironweed and goldenrod stretch away, over fields and meadows, in tumbling masses of variegated color. There are approximately 125 species of goldenrod found in the United States, many of them so similar in appearance that only trained botanists can separate them; others have definite characteristics and patterns of growth that make identification relatively easy. Some species grow in plume-like clusters, others are branched like trees, or club-shaped, slender like wands, or with broad, flat tops. Certain varieties like Canada goldenrod *(Solidago canadensis)* may stand taller than a man's head, or like the rare Blue Ridge goldenrod *(Solidago spithamaea)* of our high rocky summits, seldom growing over 6 inches high.

Many of our late-season wildflowers belong to a plant group known as "composites," where a daisy, a sunflower, or an aster is not one flower but many. The center

Black-eyed Susan (Rudbeckia hirta)

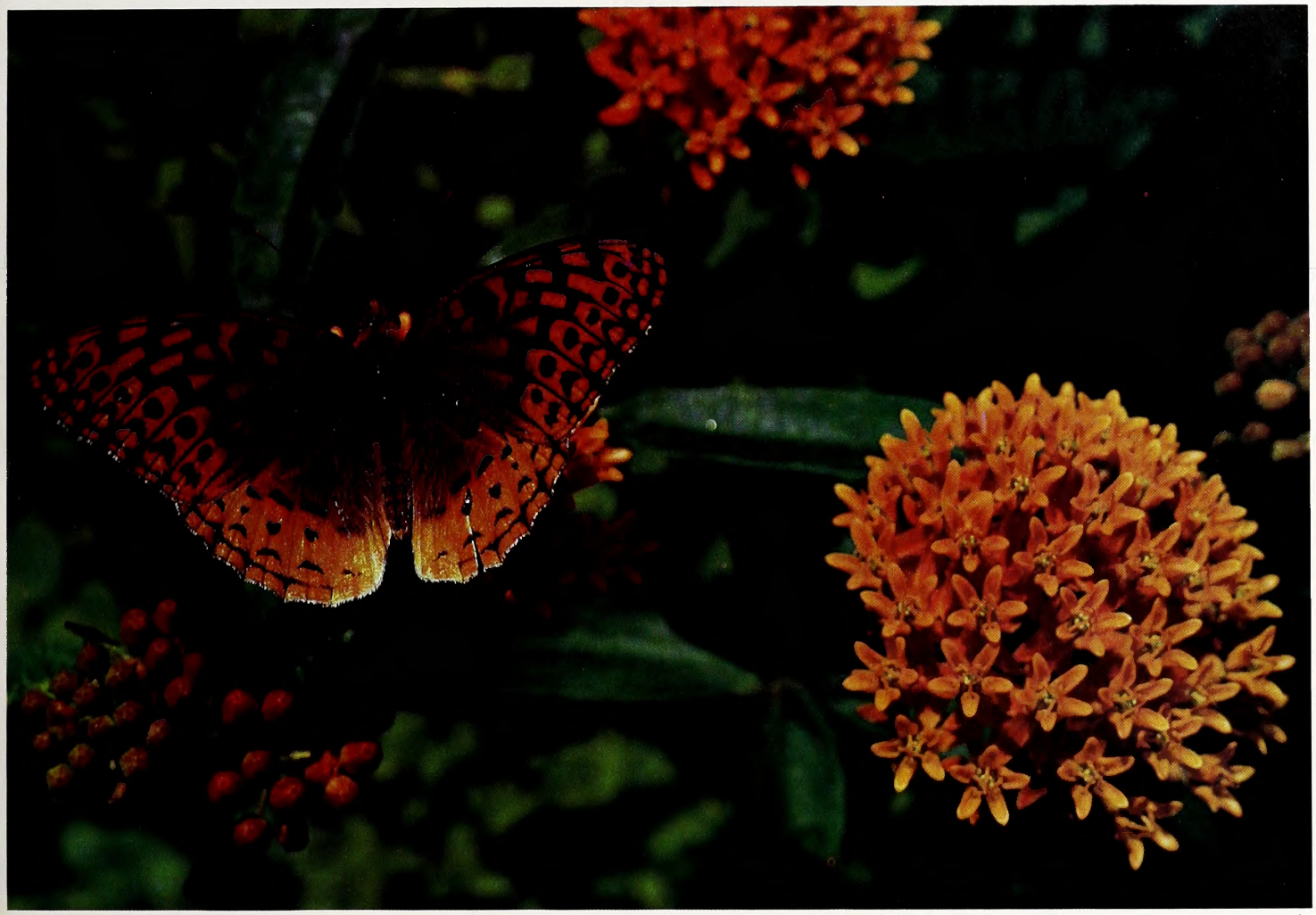
Envy has never been a part of my make-up, but I do envy those men who walked upon our land when it was a fresh floral Eden, before it was despoiled by the arrival of the bulldozers.

Fireweed (Epilobium Angustifolium)

Ladies' tresses orchid

As summer ebbs away into autumn and the first wisps of color creep down the wooded ridges, it is then that our wildflowers put on their most spectacular floral show.

Fringed gentian and goldenrod



Orange milkweed (Asclepias tuberosa) *and great spangled fritillary butterfly*

of each blossom is composed of a cluster of tiny florets, each one a complete and perfect flower, capable of reproduction. The bright showy petals serve only as landing stages for bees and other insects.

Throughout the autumn fields during the hours of sunshine, the air is filled with the roaring and humming of bees, feeding on nectar and carrying pollen from blossom to blossom in the mutual partnership of insects and flowers. Thistles, asters and milkweeds, among others, attract several hundred species of insects. Almost every meadow flower has a cloud of attending butterflies — monarchs, fritillaries, swallowtails, red admirals, and many more. A single clump of goldenrod can harbor a whole insect city — bees, butterflies, beetles and aphids, feasting among the golden blossoms. From an egg lain on a goldenrod stem by the gall fly *Eurosta solidaginis*, a larva hatches and produces a secretion that causes the formation of a globular enlargement known as a gall. Inside, the larva lives, eats and grows. After spending the winter in the gall, in the spring it transforms into an adult and emerges, a delicate little fly with banded wings.

The congregation of insects on the autumn flowers never fails to lure the insect predators — praying mantis, wasps, robber flies, ambush bugs, and crab spiders. One species of crab spider, known as the goldenrod spider *(Misumena vatia)*, can change its color from white to bright yellow to match its surroundings. Thus camouflaged, it hides among the yellow florets ready to seize any unsuspecting bee or butterfly that may chance to land among the flowers.

Eventually the wildflowers are gone and only their seeds and fruits remain. The air is filled with thistledown and milkweed floss, tiny silken parachutes carrying their cargoes of seeds. Berries redden and fruits ripen, providing a banquet for the birds. Leaves fall from day to day until at last the trees stand bare. Only one flower remains: the golden blossoms of witch hazel appear to brighten the late November woods. A chilling breeze comes down from the North, a reminder that autumn, too, is slipping away. Soon ice and snow and the wild winds of winter will sweep over the bleak landscape. But, in the eternal rhythm of the seasons, another spring will come, a spring of bloodroots and violets and buttercups — always another spring. ⊠

Evening primrose (Oenothera fiennis)

COYOTES COME TO CAROLINA

The scourge of the old west is howling at a Carolina moon these days, and not everyone is happy about it.

by Mark Taylor

photography by
Leonard Lee Rue, III

Sitting in his truck late one night last May, Bobby Maddrey was beginning to get discouraged. Maddrey, a wildlife management technician with the N.C. Wildlife Resources Commission, had received reports of coyote sightings from the community of Terra Ceia in Beaufort County. He knew that coyotes weren't native to North Carolina, but he also knew that illicit releases of the animals had established coyote populations in other southeastern states. Could that be happening here? He'd decided to check using a "siren survey."

Coyotes often respond with quavering howls to the sound of a fire or police siren, and Maddrey cruised the farmland near Terra Ceia, stopping occasionally to sound his siren and listen. On this night silence was the only response. Then it began to rain, and Maddrey decided to head home.

"As I reached town, I noticed there had been a wreck," he recalled. "A power line was knocked down, and a man came over to my truck and asked if I wanted to go around it. I said I was in no hurry, and since I had coyotes on my mind, I asked if he'd seen any. He had, and called over another man who'd also seen them. The next thing I knew I was surrounded by people talking about coyotes. I spent the next few weeks visiting farmers and other landowners, and it turned out that coyotes were common around Terra Ceia."

Coyotes, those symbols of the West so dear to fans of old western movies, are turning up in the East with greater frequency. North Carolina has its share, too.

"We began receiving reports of coyotes about 1980, and they've become more common in recent years," said Randy Wilson of Knightdale, furbearer project leader for the N.C. Wildlife Resources Commission. "The first reports came from Iredell County, and we still receive occasional reports of coyote sightings in that area. In 1983, someone killed a 'coydog,' which is a cross between a dog and a coyote, in Wake County. Coyotes sometimes mate with wolves and dogs, and the hybrid offspring can often be identified only by skull and tooth measurements. No coyotes or hybrids have been found in Wake County since then, however.

"We've also received reports of the animals from Sampson and Duplin counties, and from around Pungo Lake in Hyde and Tyrrell counties," said Wilson. "To date, we've examined only three animals in addition to the Wake County coydog. Two appeared to be pure-bred western coyotes while the skull of the coyote taken in Hyde County had some dog-like characteristics."

The scattered locations and small numbers of coyote sightings in North Carolina indicate that these are probably animals that have been illegally imported from western states and released. The coyotes at Terra Ceia, however, seem to be the only animals which may have succeeded in establishing a breeding population.

"Coyotes were first observed around Terra Ceia in 1983 by Mr. Zeno Ratcliffe," said Maddrey. "He suddenly began seeing a group of three or four adult coyotes on his farm, which is a good sign that these animals had just been released. Within a few years, farmers were seeing coyotes with pups, and in 1985 one man discovered a den with five pups on his farm. I don't think that there's any doubt that these animals have established a small population and are reproducing, and they may be dispersing into adjacent areas."

***Illegal releases of** western coyotes may account for the recent rash of coyote sightings in North Carolina. Populations are still quite low, but are expected to grow.*

The illegal importation and release of coyotes, usually by houndsmen seeking additional sport, is a long-standing problem that has been responsible for the establishment of coyote populations throughout much of the Southeast. And these releases can cause headaches for farmers and wildlife managers. Dr. Ed Hill, assistant leader of the Mississippi Cooperative Fish and Wildlife Research Unit at Mississippi State University, has studied coyotes and some of their impacts in the Southeast for the past 11 years, and is considered a regional authority on the animals.

"The coyote is a very efficient predator, and feeds on a wide variety of animals," he said. "Their major natural food year-round

***Though associated with** the West, coyotes are becoming established in North Carolina. These photographs were taken of western coyotes in western settings.*

is rabbits, and they also prey heavily on small rodents such as rats and mice. However, they are large and strong enough to prey on deer, particularly fawns. In fact, some studies of coyote feeding habits during the peak month of the fawning season have shown that 70 to 80 percent of the coyotes examined had eaten fawns."

Hill adds that studies in Oregon, Oklahoma and Texas show that predation by coyotes can limit the densities of deer herds, especially in areas with marginal habitat.

"Primarily, this is a problem in areas where protective cover for reproduction is scarce," he said. "For example, in areas where most of the forest has been cleared for agriculture, does often seek small patches of cover during the fawning season. Coyotes may take enough fawns from these small areas to depress growth in the deer herd."

The introduction of coyotes also spells trouble for local red fox populations. In such diverse locations as Maine and Missouri, studies show that red fox populations will disappear in areas where coyotes gain a foothold. Coyotes and red foxes compete for many of the same foods, and the faster and stronger coyote will catch and kill any red fox found in its territory. The smaller gray fox is able to escape coyotes by climbing trees, however, and can co-exist with them although probably in reduced numbers.

"The result of this competition is that red foxes are quickly pushed out of most of their original habitat, and are found only on the fringes or outside of the range occupied by coyotes," said Hill. "In the West, for example, coyotes are often shot on sight, and have become very wary. They've learned to avoid the valleys where most of the ranch and farm houses are located, and live in the adjacent uplands. However, red foxes have deserted the uplands, and moved down into the valleys close to houses seeking refuge from coyotes."

Hill notes that coyotes cause some problems for farmers, although these can often be prevented by confining livestock at night.

"Our number-one complaint in the Southeast is the loss of calves to coyote predation," he said. "Also, you can expect to lose some goats and lambs unless they're put up for the night, and some poultry is also lost. In addition, many people don't realize that coyotes are omnivores. They're quite fond of watermelons, cantaloupes, and other

Coyotes Come To Carolina

***Coyotes prey on** mice and rats, although they will also feed on rabbits, deer and even livestock. Competition for the same food may hurt North Carolina's red fox populations.*

melons, and sometimes cause considerable damage to these crops."

Biologists are also concerned about the future impacts that coyotes in eastern North Carolina may have on endangered red wolves, which are being reintroduced to the wild at the Alligator River National Wildlife Refuge on mainland Dare County. Red wolves weigh 40 to 60 pounds, and are intermediate in size between coyotes and timber wolves. Historically, red wolves were native to most of the Southeast, including all of North Carolina, but by the mid-1900s, they had been extirpated from all of their range except for a few remote swamps in coastal Louisiana and southeast Texas. Coyote populations expanded to fill this vacant ecological niche, and as red wolf numbers continued to decline the animals began interbreeding. By the early 1970s, biologists feared that hybridization would soon eliminate the purebred red wolf in the wild. Consequently, the few red wolves remaining in the swamps were captured and placed in zoos in Washington State, and these animals were tested to determine which were hybrids. Fourteen pure-bred red wolves were identified, and these were carefully cross-bred to produce wolves for future reintroduction efforts.

"Currently, there are no coyotes found on the refuge or in Dare County," said Warren Parker of Asheville, red wolf project leader for the U.S. Fish and Wildlife Service. "So, there will be no immediate effects on the project. However, coyote populations in Beaufort County and other areas will probably continue to grow, and we expect to begin seeing coyotes on the edge of the refuge in five years or so. That's when we'll begin seeing interactions between red wolves and coyotes.

"Generally, wild canids such as wolves and coyotes are very territorial, and resist interaction and crossbreeding with other species. You only see hybridization when the population of a species is low, and animals are unable to find mates of their own kind. By the time coyotes reach this area we hope to have established a strong, core population of red wolves on the refuge. Hopefully, these wolves will have no trouble finding other red wolves for mates."

Parker adds that anyone who sees a coyote-like creature on the refuge or in Dare County should assume that it is a red wolf, which is strictly protected by state and federal law. "Even this is unlikely," he says. "Normally, red wolves are very shy and secretive. If you're lucky you might get a glimpse of one crossing the road some night, but that's about it."

Coyote numbers are still low in North Carolina, and with the exception of those at Terra Ceia, probably don't represent established populations. Nevertheless, it's only a matter of time until the coyote establishes more widespread citizenship in North Carolina. Despite a century-long war of extermination waged by farmers, ranchers, and government agencies, coyotes have thrived and are expanding their range.

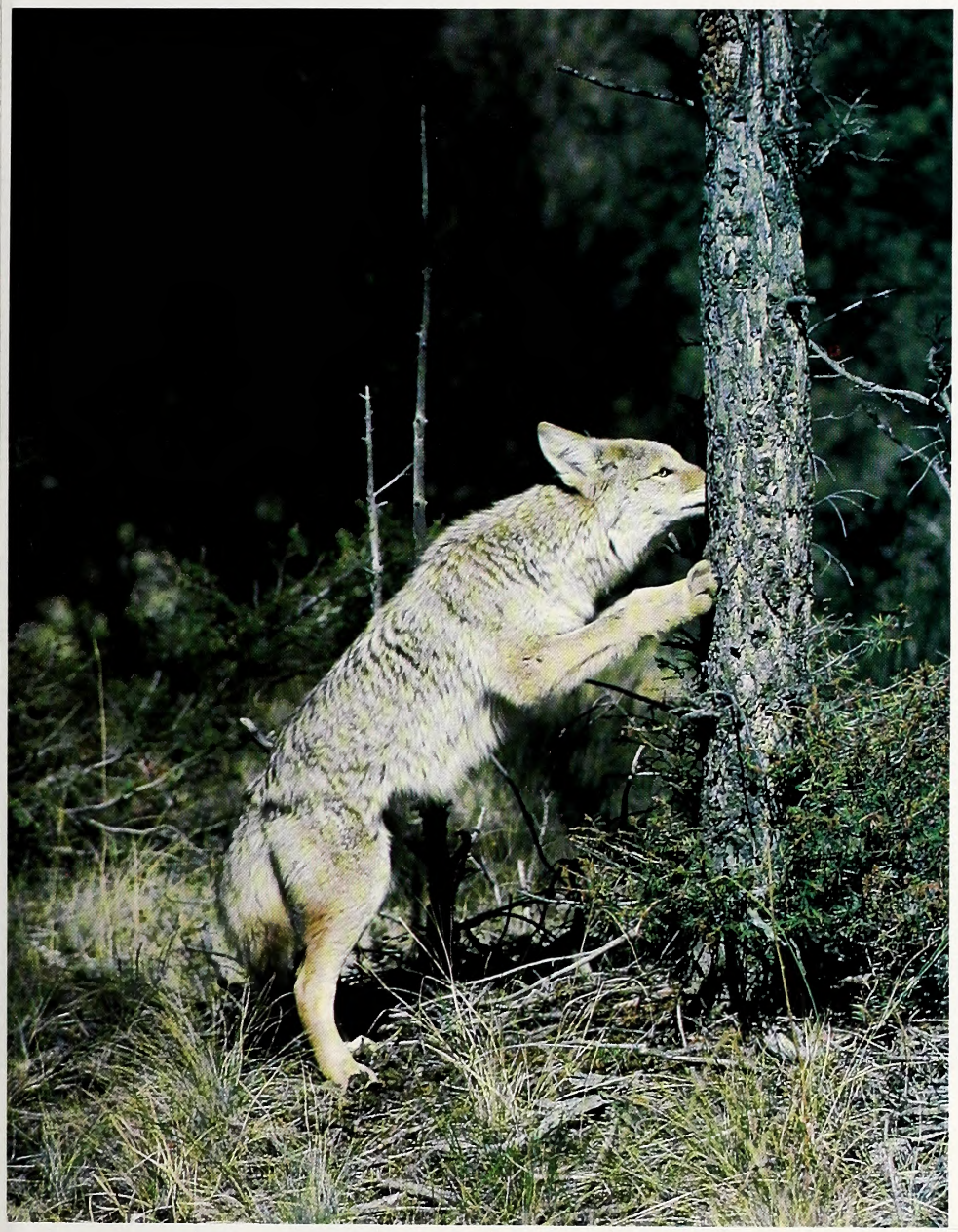
Originally, coyotes were native to the open country of the Great Plains and Rocky Mountain states of the American West. The forests of the eastern United States and Canada were inhabited by red wolves or timber wolves, and coyotes could not compete well with either. Unlike these solitary animals, however, coyotes thrived near human habitations. As wolves were killed off and the forests of the Mississippi valley and upper Midwest were cleared for farmland during the 1800s, coyotes moved eastward to the Mississippi River and into the new farmlands of Wisconsin, Minnesota and Michigan. It is a march that continues to this day, abetted greatly by man. Coyotes now are found in all of Missouri and Arkansas and most of Louisiana, Mississippi, and Alabama. They are also found in portions of Georgia and Florida, and in the western two-thirds of Tennessee and Kentucky. In the North, they have extended their range east to New England and upstate New York.

"Coyotes found in Louisiana, Arkansas, Missouri and the upper Midwest are mostly descended from animals from Texas and the Great Plains that moved East as the land was cleared for agriculture," said Hill. "However, the release of coyotes by houndsmen is largely responsible for the populations presently found in the Southeast. This has been going on since the 1920s. Although these animals would have eventually expanded into the Southeast, releases have greatly accelerated the rate of spread of coyotes."

Coyotes have also expanded their range into the Northeast. Beginning about 1900, coyotes from Minnesota and Wisconsin began moving East above the Great Lakes and across southern Ontario. The population front moved about 15 to 20 miles per year, and the animals entered New England and upstate New York in the early 1960s. These northern coyotes are larger than those found in the West — weighing from 30 to 50 pounds compared to an average of 20-25 pounds — perhaps as the result of cross-breeding with timber wolves in Canada. They are now firmly established throughout the Northeast.

Eventually, North Carolina will probably

***Coyote digs at** the burrow of a prairie dog. Coyotes have interbred with red wolves, causing concern for the future genetic integrity of the red wolves recently released on the Alligator River National Wildlife Refuge.*



***Coyote hunts for** bark beetles in this photograph taken in the Far West. This wary predator was celebrated by Indians for its cunning.*

be occupied by coyotes from the West and the North. The animals have large ranges, and much of the rapid expansion of populations occurs when the young leave their parents at about one to two years of age to establish new home territories. They usually move about 30 miles, but occasionally travel much farther. Tagging studies in the Southeast show that it's not unusual for young coyotes to move 100 miles when they strike out on their own. Coyotes in the North may range even farther afield. Two pups tagged in a study on the coast of Maine, for example, were later found in northern Vermont — crossing several hundred miles of mountains, bogs and dense spruce-fir forests to establish a new territory.

Wilson says there's really not much that can be done about coyotes in North Carolina other than to prevent their importation and release. "Those in the West are moving East, and those in the North are moving South, so they'll probably be here within a few decades. We have the type of open landscape they prefer, and they'll probably occupy the entire state eventually. Right now, however, their numbers are very low, and they're found in a few small pockets. Until coyotes reach a certain population threshold, they tend to stay together and have a hard time finding mates. Under these circumstances, even the young won't travel far, and that's why it's important that additional animals not be imported and released. The animals aren't considered native wildlife, and aren't protected. The mortality among released animals from hunting, trapping, collisions with automobiles, and natural causes is probably high."

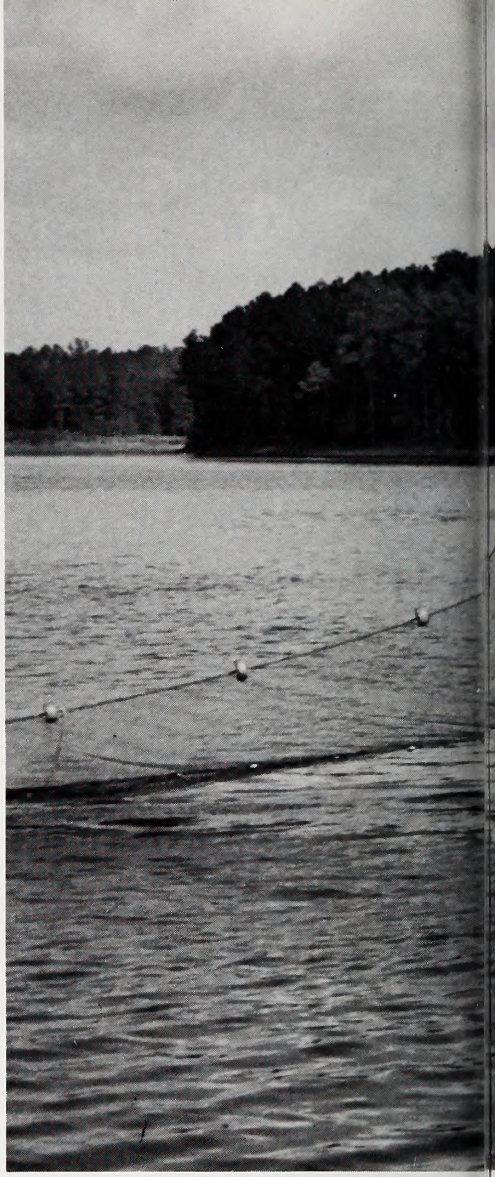
Indians viewed the coyote with admiration as a cunning trickster, and over the past century, many exasperated farmers and ranchers have grudgingly come to share this view. The coyote is a survivor. The best efforts of gun, trap and poison have just produced an animal that is equally at home in the brushy hills of Los Angeles as it is on the open prairie. The animals do take some livestock and wildlife, but their harvest of rats and other rodents and their role as a natural predator in ecosystems where one is lacking are often overlooked. And the sound of their haunting howls on a cold night is not soon forgotten.

"They certainly are interesting animals," said Wilson. "They can live just about anywhere. You could put a coyote on top of our highest mountain bald or on the beach at Ocracoke, and he'd do just fine." ⊠

Checking Up On CRAPPIES

Can crappie populations be overfished? That's one of the questions fisheries' biologists hope to answer as part of this four-year study.

by Mark Taylor / photography by Ken Taylor



Check almost any North Carolina lake in any season and you'll see crappie fishermen. Winter and fall finds a handful of hardy anglers jigging deep water for these delectable panfish. Early spring brings the crappie spawn, and the number of fish that congregate in the shallows is often exceeded only by the number of anglers fishing for them. The heat of summer drives the fish back into deeper water where they're often caught from sunken brush hides and other structure.

Crappie fishing is extremely popular in North Carolina, and it's no surprise that the Wildlife Commission's 1980 and 1985 angler-opinion surveys showed crappie to be second only to largemouth bass in popularity.

By and large, though, crappie have been taken for granted. The fish are so prolific that it was once thought that anglers could never hurt a population, and that the biggest problem is the tendency for crappies to become overpopulated and stunted. In other words, too little fishing has often been the problem. While this is still usually the case, recent research shows that extremely heavy fishing pressure can, indeed, hurt some crappie populations.

"The conventional wisdom has always been that crappie couldn't be overfished, and that overpopulated, stunted fish are normal in most lakes," said Scott Van Horn, Wildlife Commission fisheries research coordinator for the Piedmont. "In the past 10 years or so, however, biologists in Missouri have found that several of their popular crappie lakes were overfished. As a result, Missouri has developed more restrictive regulations — such as length limits and lower creel limits — to more actively manage this popular sport fish in these specific lakes.

"We don't think that crappie are being overfished in North Carolina. However, with the rapid urbanization of our state and the growing popularity of fishing, the potential is there. We believe this is a good time to begin evaluating our crappie populations, and to begin thinking about more sophisticated management of this popular resource in the future."

Wildlife Commission biologists have begun a four-year study of crappie populations in five lakes. These are Jordan and Falls lakes near Raleigh, Badin Lake near Albemarle, Lake Brandt near Greensboro, and Lake Thom-A-Lex near Thomasville and Lexington.

The study lakes are all considered good waters for crappie, and biologists sample the crappie populations using trap nets each fall. Fish caught in these nets are measured and weighed before being released. Scale samples are also taken to determine the age of the fish. When the scales are later viewed under a microscope, growth rings become visible. This information will be used to develop a profile of the crappie populations in each lake, and show if the crappie are over-populated, underpopulated, or in balance.

Van Horn adds that the management of crappie and problems with overharvest cannot be compared with largemouth bass, although both fish are found in the same waters. Many bass fishermen are more interested in catching and releasing bass than taking them home, hoping to catch the same fish again when it's bigger. On the other hand, a crappie, once caught, goes into a cooler and is taken home to eat. Few crap-

***Biologist Scott Van Horn** counts spines to distinguish white from black crappie. Black crappie have more spines than white crappie. Grouping samples of fish by species and size is an effective way to evaluate fish populations.*

***Fisheries biologists trap-net** crappie at Falls Lake in Raleigh. A four-year population study of crappie in five lakes will determine whether overfishing is troubling this popular resource.*

pies are ever released, and in most lakes that's good.

"In many respects, managing crappie is similar to managing a commercial fishery," said Van Horn. "Our goal is to provide the optimum harvest of fish that a lake will sustain. So, if a lake is overfished, it doesn't mean that anglers aren't catching any crappie. It just means that the fish are removed before they are fully grown. In Missouri, for example, most crappie were being removed from overfished lakes by the time they were 6 inches long. These fish weren't stunted; they just hadn't had a chance to put on much weight. But it takes biological data to determine whether fish are small because they're stunted, or simply not yet grown.

"After a 9-inch size limit was enacted on the Missouri waters, they produced more pounds of fish than before even though the numbers of fish caught dropped. If a regulation is too stringent, however, then natural mortality from disease, predation, and old age will outweigh the increase in growth. It's a matter of finding that balance between optimum growth and natural mortality."

So far, the one-year old crappie survey hasn't revealed any particularly surprising results, although Van Horn has noted differences between the waters. Jordan and Falls lakes appear to have an over-population of stunted black crappie. The fish are slightly larger in Falls Lake, running from 6 to 8 inches. However, Jordan Lake holds a few unusually large white crappie.

"The big white crappie in Jordan are probably fish that were spawned the first year the lake was impounded," he said. "White crappie are generally better adapted to handle turbidity and flow than black crappie, which prefer clearer, still waters. In the years following impoundment, it appears that the black crappie population boomed and the fish quickly outstripped their food supply."

Lakes Thom-A-Lex and Badin both hold healthy populations of good-sized black and white crappie. Black crappie dominate in both lakes, and some three-year old black crappie weigh a pound in Badin Lake. The fish are slightly smaller on the average in Thom-A-Lex.

Lake Brandt also has good populations of black and white crappie. The fish are fairly large, and most of the big fish are white crappie. Fishing should be good in the future because there are plenty of smaller fish coming along with good growth rates.

"We've also looked at crappie in some of the coastal streams on the north side of Albemarle Sound," said Van Horn. "These streams offer excellent crappie fishing with populations in good shape and lots of big fish."

It's still far too early to predict the long-term findings of the new crappie study, nor do the biologists expect to uncover anything unusual. But these studies will give them the background information to measure changes, and managing the state's second-most popular fish will be easier in the future. ⊠

Tops In Conservation

Tar Heel Boy Scouts Lead The Field

Written and Edited by Mark Taylor

North Carolina's Piedmont Council of the Boy Scouts of America was recently honored for its outstanding conservation program. The council received a U.S. Department of Agriculture Award, which recognizes the best program among the nation's 410 Boy Scout councils.

"We've had an on-going conservation program for some time, and most of our work is done at Camp Bud Schiele in Rutherford County," said Don McKinney, director of field services for the Piedmont Council.

"This camp is about five years old, and we worked closely with the Rutherford County Soil and Water Conservation District in its development. The camp also participates in the American Tree Farm program, and thousands of pines and hardwoods have been planted there over the past five years. In addition, we have a long-range conservation plan for the property, and employ a conservation specialist for the summer who works closely with the boys."

During the past year, three additions were made to the camp. A 20-station self-guiding nature trail was established, and was used last summer by over 2,500 young people. A digital weather station was installed, which proved popular, and a "memorial forest" was established.

"The memorial forest created a lot of interest," said McKinney. "It allows a boy to plant a tree and have it registered in his name. This helps fulfill some requirements for merit badges, and hopefully some of the scouts will return in 10 or 20 years to see how 'their tree' is doing."

Field Notes

Hunting seasons opening or closing this month.

Deer:
- Eastern bow and arrow season closes Oct. 3
- Eastern muzzleloading season Oct. 5-10
- Eastern gun season Oct. 12-Jan. 1
- Central bow and arrow season open through Nov. 7
- Northwestern bow and arrow season open through Nov. 14
- Western bow and arrow season open Sept. 7-Oct. 3 and from Oct. 12-Nov. 21 (see *Regulations Digest* for Yancey County exception)
- Western muzzleloading season Oct. 5-10

Dove: Early season closes Oct. 15
Black bear (western): Oct. 12-Nov. 21 and Dec. 14-Jan. 1
Wild boar: Oct. 12-Nov. 21 and Dec. 14-Jan. 1
Gray and red squirrel: Oct. 12-Jan. 30
Fox squirrel: Oct. 12-Dec. 31 (in open counties)
Grouse: Oct. 12-Feb. 29
Raccoon (western): Oct. 12 (at sunrise)-Jan. 30
Raccoon (eastern): Oct. 19 (at sunrise)-Feb. 29

Check regulations digest for information on season boundaries, either-sex seasons, bag limits, and other regulations. Waterfowl regulations are set within a framework of federal regulations, and were not yet available at press time. Copies of the waterfowl regulations may be obtained from license agents. Sportsmen are reminded that all big game (deer, bear, wild boar) must be tagged and reported.

Book Review

Sundown Covey A Good Read

Sundown Covey by David Henderson. Published by Amwell Press, P.O. Box 5385, Clinton, N.J. 08809. 204 pp., hardcover. Autographed copies available for $22.50 from Patrick Publications, 400 Law Building, Charlotte, NC 28202.

What is a "sundown covey"? It's a special covey of quail that you save to hunt at the end of the day when long shadows fall across cold fields and a setting sun throws a bar of orange above a dark treeline.

David Henderson's newest book of essays is a lot like a sundown covey, the story from which the book draws its name. It's something special to be savored. With gentle humor and eloquent writing, Henderson chronicles the hunting, fishing and wild creatures and places he has enjoyed in a lifetime in the outdoors, mostly in North Carolina. The accompanying pencil drawings by his daughter, Shep Foley, are a fine complement to the text.

This book won't help you catch more fish or shoot more quail, but it will help you appreciate the chase.

McLean Named Top Officer

A North Carolina Wildlife Resources Commission enforcement officer from Columbus County has been named Wildlife Officer of the Year by the Shikar-Safari Club International.

Master Officer Milton S. McLean of Rt. 1, Hallsboro, received a plaque, a pewter plate and a copy of the club's cookbook.

The club, formed in 1952 by a group of international hunters, is known for its donations to conservation projects throughout the world. Each year, the Club names an officer of the year in each of the 50 states and the Canadian provinces.

McLean is a 17-year veteran of the Commission's Enforcement Division. He was employed after serving in the U.S. Army, and is a graduate of Bladenboro High School in Bladen County. He also attended Southeastern Community College.

Wildlife Favorites

Recipes Available

Looking for a good recipe for fricasseed squirrel or perhaps whistle pig delight?

These recipes, and many others less exotic for deer, quail, dove, seafood, fish and other wild game, are featured in *Wild Game Recipes*. This booklet is a collection of favorite recipes contributed by Wildlife Commission employees, and was a "sell-out" (even though it was free) when first published in 1985. The booklet was so popular that it was reprinted again last summer.

Free single copies may be obtained by writing RECIPES, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Appointed To Six-Year Terms

New Wildlife Commissioners Sworn In

Five new members of the Wildlife Commission were recently sworn in, and another commissioner was reappointed to serve another term.

Governor James G. Martin joined Commission members and staff as state Appellate Court Judge Robert Orr administered the oath of office to Robert E. Barnhill Jr. of Tarboro, Robert W. Hester of Fairfield, R. Reed Allen Jr. of Lake Waccamaw and Howell W. Woltz of Advance.

Barnhill, an at-large appointee, was Martin's choice to fill the unexpired term of J.C.D. "Jack" Bailey who had resigned in March. Barnhill is president of Cumberland Paving Co., president of Barnhill Contracting Company and chairman of the board of the Barnhill Company. His term expires in 1989.

Hester, a Hyde County farmer and regional distributor of Dekalb Pfizer Genetics, was appointed to represent wildlife District 1, which includes counties in northeastern North Carolina. Hester graduated from the University of North Carolina at Chapel Hill with a degree in history. He has served on the N.C. Environmental Management Commission, the N.C. Mining Commission, and is a recipient of the N.C. Governor's Award for Water Conservation. His term expires in 1993.

Allen, a broker for Fidelity Financial Services of Raleigh, was appointed to represent District 4, which includes counties in southeastern North Carolina. Allen holds degrees from Appalachian State University and is a native of Whiteville. His term expires in 1993.

Woltz, president of GMW Industries located south of Winston-Salem, will represent District 7, which includes counties in the northwestern part of the state. Woltz is a member of Quail Unlimited, the International Quail Foundation, Trout Unlimited, the N.C. Wildlife Federation, the Nature Conservancy and the Ruffed Grouse Society. He holds degrees from the University of Virginia and Wake Forest University. His term also expires in 1993.

ANGIE HILL

Commissioners Take Oath: *Secretary of State Thad Eure (right) administers the oath of office to two members of the N.C. Wildlife Resources Commission during a ceremony on Aug. 31 as State Sen. J. Richard Conder (left) of Rockingham looks on. From left are Sen. Conder, Commissioner Donald A. Thompson of Mt. Gilead, Commissioner John F. Lentz of Ellerbe, and Eure. Thompson was appointed in 1982 as House Speaker Liston Ramsey's appointee. Lentz will serve his first term as Lt. Gov. Bob Jordan's appointee.*

ANGIE HILL

New Commissioners On Board: *State Appellate Court Judge Robert Orr (right) administers the oaths of office to four new members of the N.C. Wildlife Resources Commission. Gov. Jim Martin named the four to fill one vacant and three expired terms on the Commission. The new appointees from left and the districts they represent are: R. Reed Allen Jr. of Lake Waccamaw (District 4), Howell W. Woltz of Advance (District 7), Robert W. Hester of Fairfield (District 1) and Robert E. Barnhill Jr. of Tarboro (at-large).*

At the same meeting, *Goldsboro News-Argus* editor Eugene Price was elected unanimously to a two-year term as chairman of the Wildlife Commission.

Price, editor and vice president of the Goldsboro newspaper, has served as a commissioner for two years. Gov. Martin appointed Price in 1985 to represent wildlife District 3 which consists of 11 counties including Wake, Wayne, Edgecombe, Johnston.

At a later meeting, two other commissioners were sworn in.

John F. Lentz of Ellerbe, who was appointed by Lt. Gov. Bob Jordan, and Donald A. Thompson of Mt. Gilead, who was reappointed to the Commission by House Speaker Liston Ramsey, took their oaths of office. State Sen. J. Richard Conder of Rockingham introduced the two appointees on behalf of Ramsey and Jordan, and Secretary of State Thad Eure administered the oaths. Terms of office for both men run through 1989.

Thompson was first appointed by Ramsey in 1985 to a two-year term. Lentz replaced Dr. Richard W. Adams as Jordan's appointee.

Thompson, a Montgomery County farmer, is also a Mason and a member of the Eastern Star fraternal organization. He is a member of the Mt. Gilead School Advisory Committee, director of the Montgomery County Farm Bureau, and a Baptist Sunday School teacher. He is married and has two children.

Lentz, owner of Lentz Realty in Ellerbe, served as president of the N.C. Wildlife Federation in 1981 and central vice president from 1978-80. He is a 28-year member of that organization. He is now serving his second term as regional director of the National Wildlife Federation and also serves as chairman of the Board of Trustees of the N.C. Conservation Education Fund. He also attended Duke University and serve d in the U.S. Navy.

Calendar Of Events

October 1-3
9th Annual U.S. Open King Mackerel Tournament in Southport.

October 2-3
Spot Festival in Hampstead.

October 3
Latta Plantation Folklife Festival in Huntersville. Features traditional crafts, music and dancing.

October 9-10
7th Annual Statewide Native American Cultural Festival at the Cumberland County Memorial Auditorium in Fayetteville. Features traditional Indian dancing, ceremonies, artifact displays, and other events.

October 9-11
9th Annual North Carolina Waterfowl Weekend at Nags Head. Features waterfowl carving, painting, and decoys. For more information write Waterfowl Weekend, SR 89, Kitty Hawk, N.C. 27949.

October 17-18
North American Hunting Retriever Association Licensed Field Trial at the Duke Power Marshall Steam Station in Terrell. For more information contact Charles Jurney, 103 N. Church St., Mooresville, N.C. 28115.

October 24-25
Fall Living History Weekend at the Duke Homestead in Durham. Demonstrations of 19th century skills.

The 1988 North Carolina Wildlife Calendars Are Here!

For the past two years, these calendars have sold out quickly. Order yours today by returning the form below with your check or money order to: 1988 CALENDAR; N.C. Wildlife Resources Commission; 512 N. Salisbury Street; Raleigh, NC 27611.

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CALO 88

ACI Presents Awards

Pamlico Article Wins Top Prize

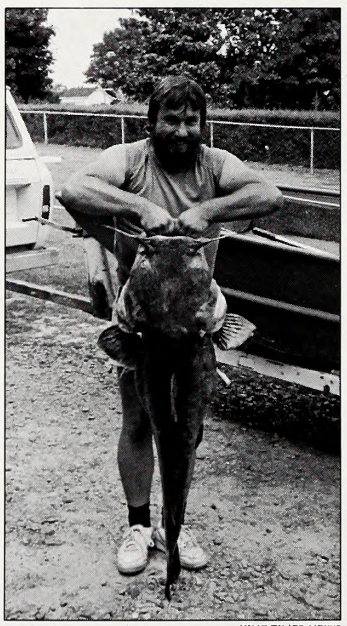
Several publications programs of the N.C. Wildlife Resources Commission were recently honored in competition sponsored by the ACI (Association for Conservation Information) in 1987. The ACI is a professional organization of conservation educators within state, federal and provincial wildlife and natural resource agencies in the United States and Canada.

"Trouble On The Pamlico," published in the May 1986 issue of *Wildlife in North Carolina*, won first place as best magazine article. It was written by Assistant Editor Mark Taylor, and examined the problems and controversies surrounding water quality in the Pamlico River and sound. This is the third time in four years the magazine has won first place in this category.

"The Wildlife Newsletter," which was also written and edited by Taylor, tied for fourth as Best News Program, and the *1987 North Carolina Wildlife Calendar* finished fourth in the special publications category.

Record Shattered

Biggest Cat On Block



KING TIMES-NEWS

Meeting Your Match: *Royce Flippin of King got more than he bargained for when he went fishing for catfish last June 11. Fishing below Idol's Dam on the Yadkin River in Davie County, he caught this 62-lb., 7-oz. flathead catfish. The fish, 49 inches long with a 31-inch girth, set a new state record. Flippin was using live shad for bait, and also caught a small catfish on the same trip — a 25-pound flathead!*

Good fishing for flathead cats is also found in the Cape Fear, French Broad and New rivers.

Wildlife Going To State Fair

As autumn chases summer's leaves from trees, the North Carolina State Fair comes to Raleigh. This year it will be held from Oct. 15-26 at the State Fairgrounds. If you're planning to attend, be sure to drop by the Wildlife Commission exhibit housed in a large tent near the Village of Yesteryear.

Wildlife Habitats of the State, from the mountains to the coast, will be featured. Also, the state's freshwater fish will be exhibited in aquariums, and Wildlife Commission personnel will be on hand to answer questions about youth programs, wildlife and fishery management, hunting and fishing regulations, and other programs.

The 1988 North Carolina Wildlife Calendar and subscriptions to *Wildlife in North Carolina* magazine will also be sold in the tent.

Currituck, Pamlico Added

Steel Shot Zones Expanded At Coast

Steel shot will be required for waterfowl hunting in all of Currituck and Pamlico counties in addition to national wildlife refuges in North Carolina this fall.

Problems with lead poisoning of waterfowl led to a national ban on the use of lead shot, and the U.S. Fish and Wildlife Service is phasing in the use of nontoxic steel shot over a five-year period. In steel shot zones, hunters must use steel shot in all gauges for any waterfowl hunting including the early wood duck season.

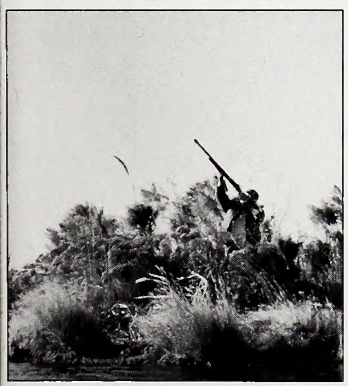
The establishment of steel shot zones is based on the number of waterfowl harvested per square mile. Those counties with the highest harvests — over 20 birds taken per square mile — must be included as steel shot zones in the 1987-88 waterfowl seasons. Currituck and Pamlico counties both fall into this category. Steel shot will be required for Beaufort and Washington counties in the 1988-89 waterfowl seasons, in New Hanover County in the 1989-90 seasons, and in Bertie, Carteret, Chowan, Craven, Dare, Hyde, Pasquotank and Robeson counties in the 1990-91 seasons. The remaining counties will be required to use steel shot during the 1991-92 seasons.

Much controversy has surrounded the use of steel shot, but numerous studies have shown that steel shot can be highly effective if properly used. The ballistics of the two do differ, however, and hunters should change their shooting techniques to use steel shot effectively.

The first step is to use a larger shot size. For large ducks, such as pintails and mallards, the best choice is No. 2 steel shot. Number 4 steel shot may be used for smaller ducks such as teal, but No. 2 steel shot is still the best all-round choice. Goose hunters should not use anything smaller than No. 1 or BB shot in steel.

Steel shot also forms a tighter shot pattern than lead shot, and doesn't string out as much in flight. Hunters may compensate for this by using a different choke. The tightest choke that should be used with steel shot is a modified, which will shoot an exceptionally tight pattern — especially at close ranges. An improved cylinder is probably the best choice for shooting steel shot.

Another difference lies in muzzle velocities. Steel shot is less dense but harder than lead. It also weighs less and doesn't deform when fired. This allows steel shot to travel over 100 feet per second faster than lead shot. Hunters may need to shorten their leads to adjust for this difference. At close ranges (from 20 to 25 yards) hunters using steel shot should use virtually no lead, and place the barrel right over the bird. From 30 to 40 yards lead birds by only one or two feet. If you find yourself missing shots, try shortening your lead. Pass up shots at ranges over 40 yards because the chances of crippling birds increase considerably for lead or steel shot.



JACK DERMID

New Rules: *North Carolina waterfowl hunters will be required to use steel shot in Currituck and Pamlico counties in addition to all federal wildlife refuges this fall. Use of steel shot is being phased in nationally over the next five years.*

Memory Of Skunk Lingers

Dear *Wildlife:*

I enjoy reading *Wildlife in North Carolina* very much, and especially enjoyed your Carolina Profile of Q.J. Stephenson several months ago. My mother lived next door (across the field) to Q.J. and his family, and they were always very good neighbors and good friends.

I'll never forget the time Q.J. caught a "skunk" in one of his traps. There was no way he could get close enough to free the animal, and much to his regret he had to put the skunk out of its misery — and right into ours! It really was a beautiful animal, but the wind blew in our direction for several days running, and it's an odor you don't easily forget.

We think we saw an albino deer between Jackson and Rich Square several months back. It's the first we've ever seen.

— Jeri Boone Jackson

The Wildlife Endowment Fund Report

The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife in North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Status on July 31, 1987

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	43,075	$12,279,147.89
Lifetime Hunting License	211	41,621.67
Lifetime Fishing License	3,209	540,670.77
Lifetime Subscriptions to Wildlife in N.C.	1,150	141,690.75
Contributions	—	90,826.13
Fund Total		$13,093,957.31
Total Interest Earned	$1,901,255.25	

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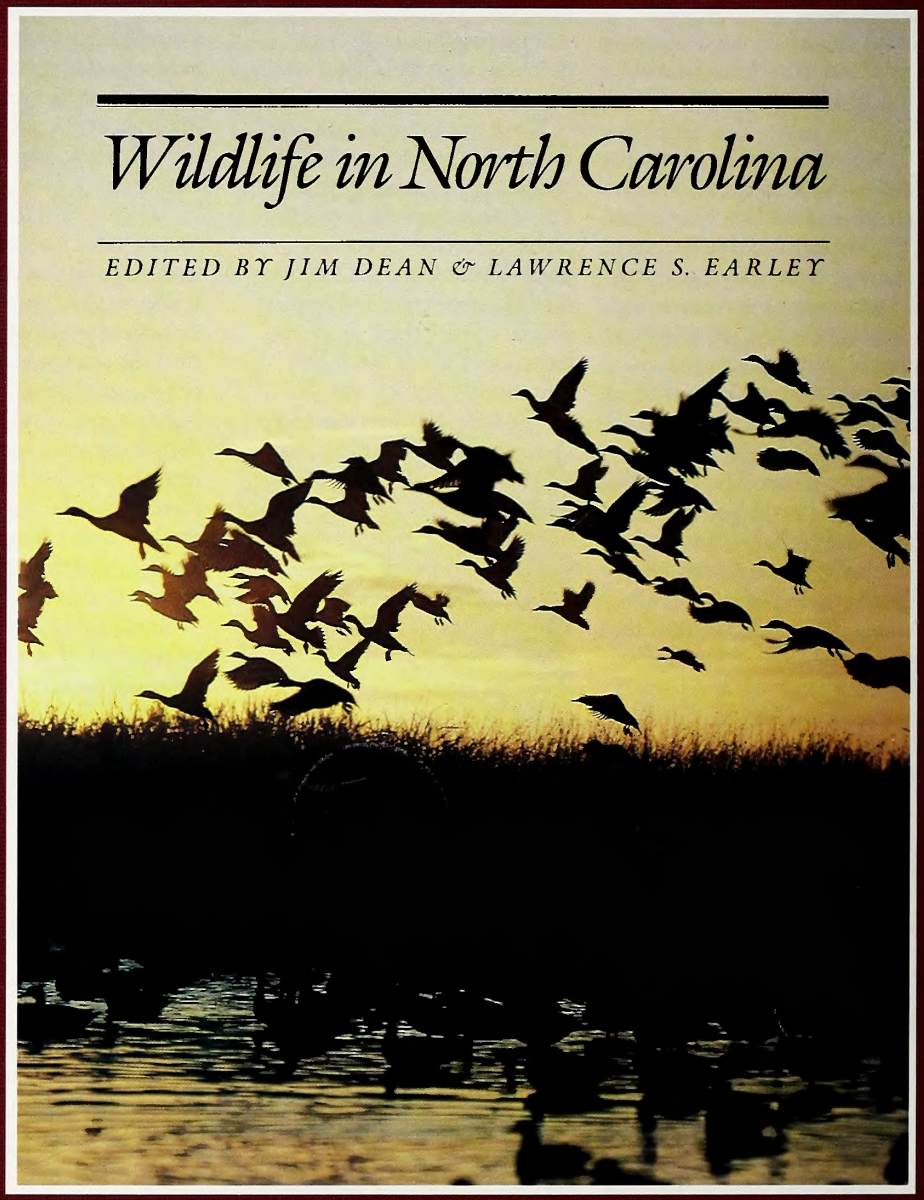

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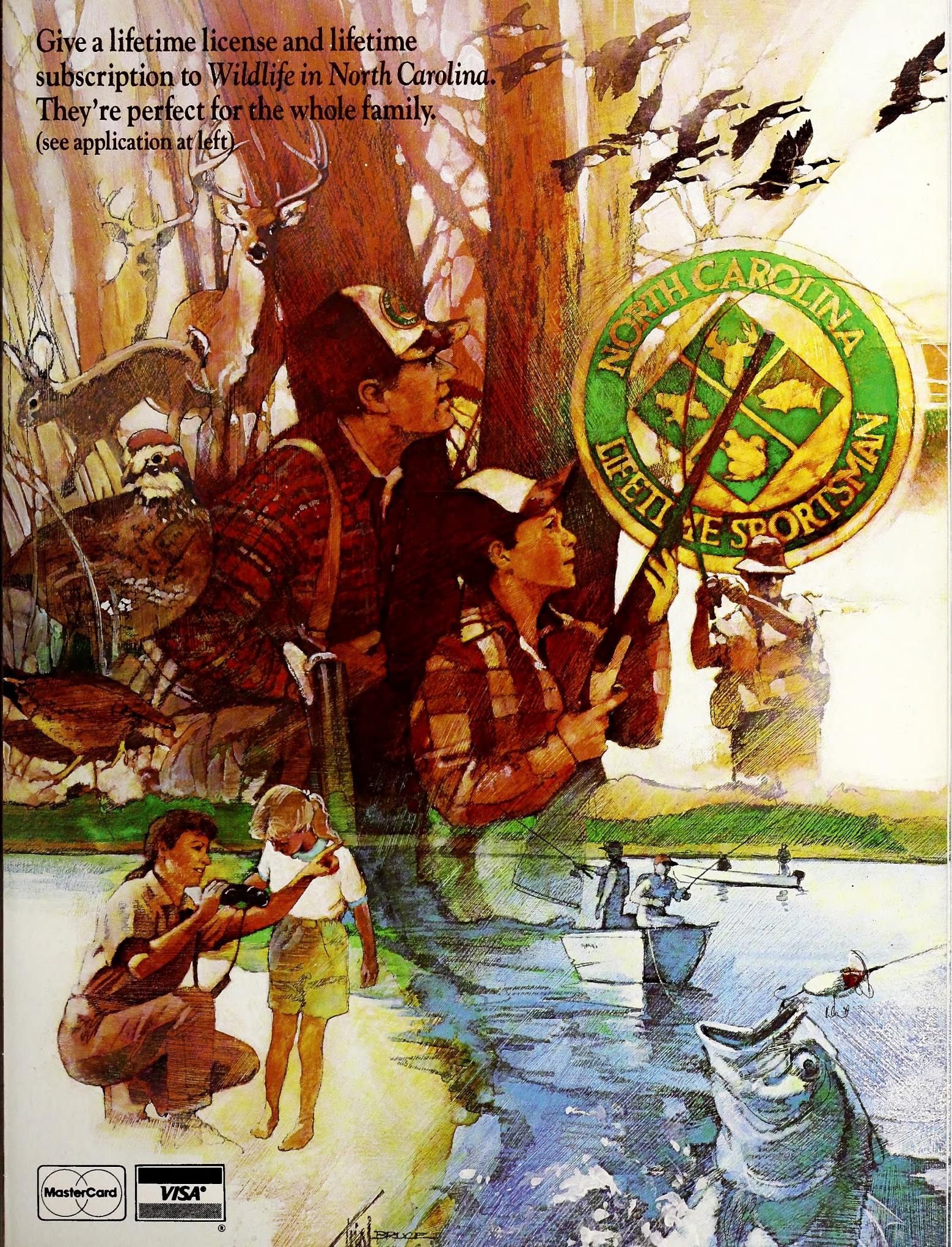

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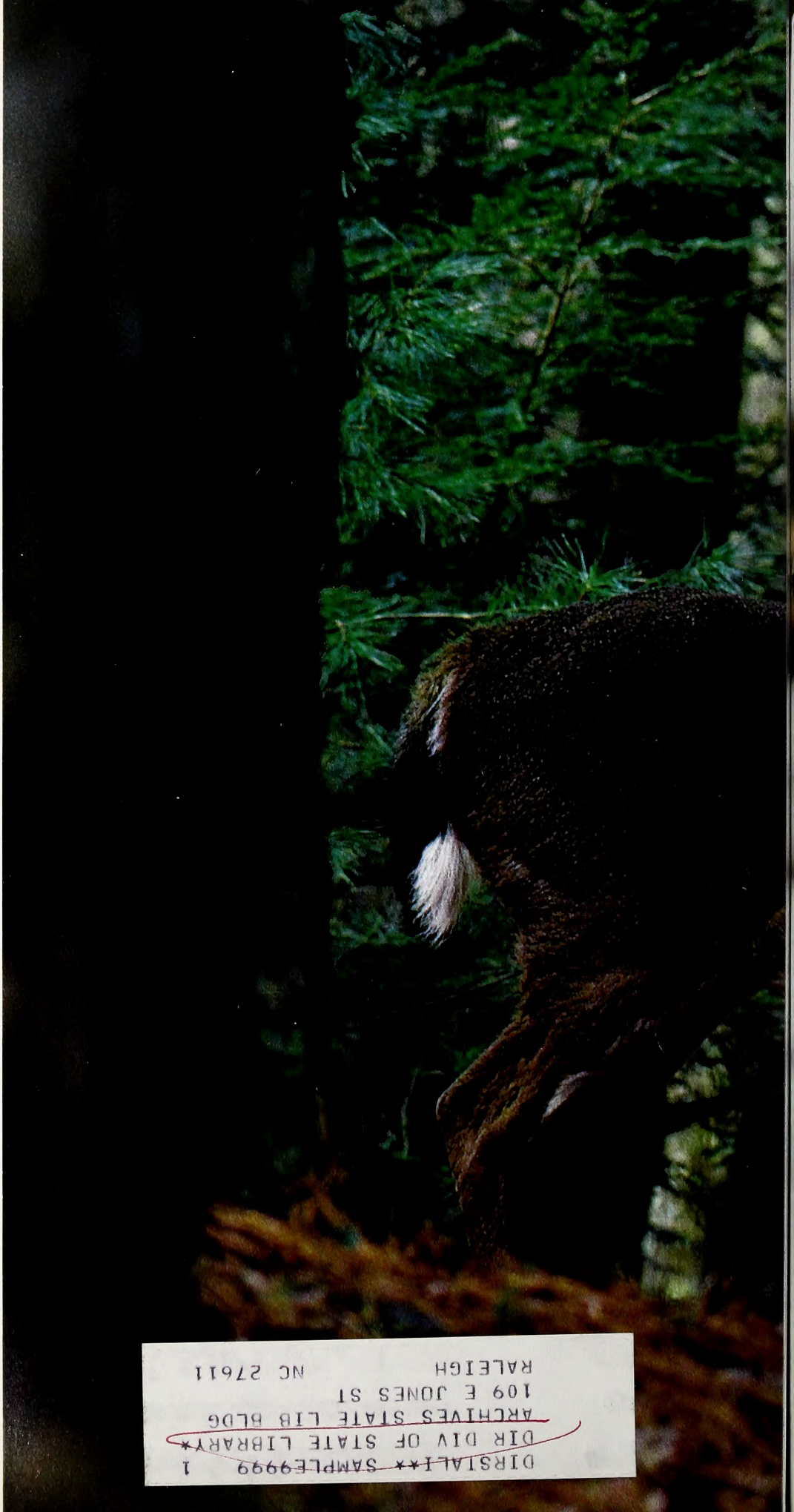

Appalachian Whitetail

This handsome buck pauses on a Smoky Mountain ridge, but there will be no loitering, and the photographer gets only one chance.

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A Jetty Too Far

by Jim Dean

A brisk northeastly wind whipped a stinging spray off the crests of the waves, and even in the pre-dawn darkness, we could see the long, white rollers washing over the narrow jetty at the southern tip of Wrightsville Beach. Tom and Andy were far more excited about the prospects of walking out on that dark, slippery wall of cinderblocks in mid-winter than I was, even if there were, as promised, big spotted seatrout feeding in the deep water that flowed through the inlet along the south side of the jetty.

It was cold, and the heavy wool sweater, rain jacket and chest waders seemed to offer no more warmth than a pair of shorts and a T-shirt, although they certainly weighed enough to make the possibilities of an untimely swim seem unpleasant, even foolhardy. Furthermore, the four cups of strong coffee I'd just swilled at an all night establishment on the causeway had made me as jumpy as a dirt road lizard.

"I don't like the looks of this," I said as plug rods were jointed and lures tied on.

"Just take it slow, and you'll be all right," added Andy. "If you fall off, try to fall on the left side where the waves are breaking. It's shallow enough to stand there. The other side is deeper, about 40 feet I think."

Andy showed me how to pass someone on the jetty should the need arise. Since the wall appeared to be only about as wide as the length of my booted foot, two anglers passing would have to grasp one another like long-lost lovers and pirouette. It was not an encouraging bit of instruction.

Moments later, Andy and Tom were gone, and I could hear them laughing in the blackness as they shuffled seaward.

Oh well, I thought, it won't be the first stupid thing I've done in a lifelong quest for fish. Cradling my rod and reel, I stepped onto the jetty and began to inch my way out. The top of the jetty was covered with greasy algae, requiring careful placement of each foot. Waves broke over the top at intervals, but I managed to travel what seemed to be several miles — actually only about 50 yards — until I realized that someone was ahead of me on the jetty. Andy and Tom had already passed the unknown angler, and were halfway to Portugal. Beyond him, I could see bigger waves pouring over the wall.

As I contemplated passing him, a wave broke underfoot and lifted me off the wall. For a terrifying moment, I was waterborne, then the wave passed, setting me back atop the wall. This looks like a pretty good spot, I decided.

A pale light had begun to filter through the gray, scudding clouds by the time it occurred to me that I might do something besides stand there and watch for incoming waves.

Cautiously, I cast my MirrorLure into the inlet, and began to retrieve. After several casts, I began to feel more confident. This isn't too bad, I thought. Then, I had a strike, but instead of a trout, it turned out to be a small bluefish that had virtually engulfed the MirrorLure. The hooks were so firmly embedded that I rammed my thumb through the gills from the rear to hold the blue's mouth open and work the hooks loose. Just as the lure came free, my thumb slipped forward and the blue gulped convulsively.

How can it be, I considered, that I find myself freezing at dawn in mid-winter perched on a slick razor of concrete with the tip of my thumb protruding from the mouth of a dying bluefish that has clamped two rows of sharp teeth all the way to my knucklebone?

"Catch one?" asked the angler a dozen feet beyond me.

"Yeah, sort of," I answered as I literally tore the head off the bluefish and extracted my thumb. My arm was bloody to the elbow. Most of the blood was mine. I tossed the blue into the inlet.

"You're not keeping them?" asked the surprised angler.

"Nah, he's too small," I answered casually. I feigned an exaggerated yawn, and tried to look bored. "Looks like there's nothing around today but these little blues. I think I'll take a break."

"Yep, it's pretty dull out here this morning," replied the angler.

I began to inch my way back to the beach, pausing at intervals and looking around with what I hoped would appear to be a reluctance to leave such a lovely panorama. The beach, now fully visible in the growing light, seemed to be several light years away.

When I finally stepped off the wall into the sand, I borrowed a none-too-clean towel from a surf fisherman, and wiped off most of the blood. The look he gave me when I handed it back was exactly the look I would have given anyone who would throw up in my living room, then leave.

"Why didn't you come out?" asked Andy when he and Tom finally came in and found me sitting on the beach.

"I did come out a pretty good ways, but all I could catch was bluefish," I replied. "How did you two do?"

"Not even a strike," said Tom. "We'll try them again later. Say, what happened to your hand?"

"My hand?" I answered looking at it as though I was noticing it for the first time. "I must have snagged it on something. No problem."

Postscript. No, I did not go out on the jetty again. I will never go out on that jetty again in any season. All fishermen are crazy, but not all fishermen are that crazy.

November, 1987
Volume 51, Number 11

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and Community Development

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Cover *A ruffed grouse looks for a meal along a snow-covered ridge in the Southern Appalachians. Photograph by Leonard Lee Rue, III.*

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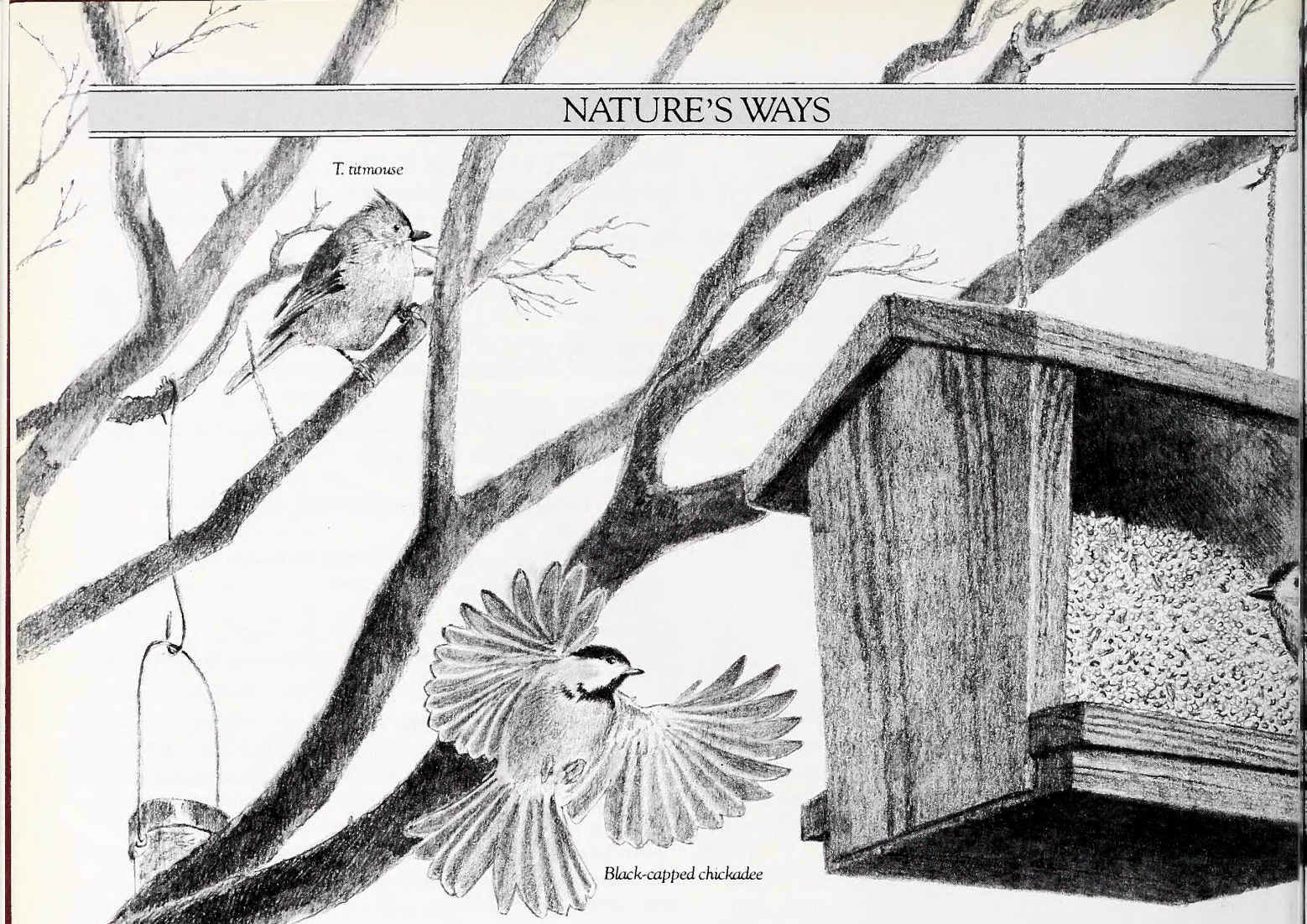
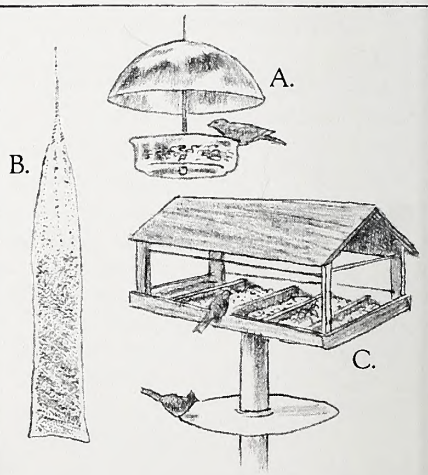


Filled with thistle *and sunflower, the Yankee Feeder draws chickadees, tufted titmice and finches. This design can accommodate several birds at a time, but generally doesn't need refilling for several days.*

Suet feeders can *be made easily with simple materials, including a pine cone, an onion or fruit bag made from coarse mesh, and a small log with several holes chiseled in it. Suet will attract blue jays, certain warblers and the tree sparrow.*



Store-bought feeders *are designed for particular birds. A seed saver (A) with adjustable top attracts birds of specific sizes. The thistle-stocking (B) is popular with goldfinches. The compartment feeder (C) allows you to test foods.*

Feeding Winter Birds

written by Lawrence S. Earley / illustrated by David Williams

***Birds need your** help in winter. Some common feeders, like this glassed box hopper, will help birds make it through the cold months. One of the most popular feeding stations, it attracts jays, cardinals, chickadees and tufted titmice, as well as the omnipresent sparrows.*

Tufted titmouse

Now's the time to be putting in your bird feeders and stocking up on food for winter birds. The birds will still be feeding on natural foods, but your bird feeders will supplement their diets. More important, birds will become accustomed to coming to your yard.

There are some rules of thumb regarding the feeding of birds in winter. Some authorities recommend filling feeders early in the morning in winter, because birds generally experience their highest weight loss during cold nights. Once you begin your feeding program, don't stop. Once birds become dependent on your feeders, you may increase their chances of starving if you neglect them for a week or two. At the very least, the birds you have presumably been attracting will go elsewhere. Also, don't despair if they don't show during the first week or two — it may take birds that long to become aware of your food, especially if your neighbors are also feeding them nearby.

No matter what you do to attract birds, some yards are better at pulling them in than others. That's just the luck of your habitat. A house flanked by a meadow and a piece of woods will be richer in bird life than a typical small urban yard flanked by other yards. Ponds or marshy areas adjacent to yards also have a magnetic effect on birds and other wildlife.

But there are many things you can do to attract birds to your yard in winter and to keep them reasonably contented once there. Perhaps the key word in feeding birds is "variety" — in your yard's natural habitat, bird feeders and placement, and foods.

Yards that attract birds have a varied habitat of lawn, trees and bushes of different heights. Feeders can be hung from trees or in an open part of the lawn, but shrubs planted nearby feeders provide cover and shelter for birds as they feed. Dense bushes such as pyracantha and small evergreens are especially desirable as shelters after other bushes drop their leaves.

Unless you're keen on only a few species, a diverse selection of bird feeders will ensure the most kinds of birds. The accompanying illustration shows some of the bird feeders available, and the birds that they attract. Placement means a lot, too. Don't crowd them all around your kitchen window, even if that's where you want to spend time watching them. Feeders at the far edge of your yard may reduce some of the congestion at window feeders, and may even winnow away some of the troublesome grackles or starlings.

Another thing: bird feeders aren't the only way birds can be fed. Handfuls of seed mixes thrown on the ground will attract doves, brown thrashers and towhees (as well as starlings). Preparing a mixture of suet and fixing it to a tree will provide necessary fat to the birds' diet. And smearing a peanut butter-cornmeal mix onto tree bark gives another variation to the birds' diet. (Just mix equal parts of peanut butter and cornmeal — ornithologist Roger Pasquier says the mix will not cake the birds' mandibles.)

Foods? Cereal grains — corn, wheat, oats, rice, millet and grain sorghums — are one of the most important food groups. Also nutritious are nuts (ground small), and suet mixtures (see recipe). A flat tray with orange and apple pieces and raisins will attract birds, too.

It's difficult to decide who benefits most when we feed birds in winter — the birds or ourselves. Luckily it's not a question we need to answer.

Suet Mix

3 cups melted suet
1 cup cornmeal
1 cup peanut butter
1 cup birdseed or nutmeats
1 cup coarse brown sugar
1 cup raisins or currants

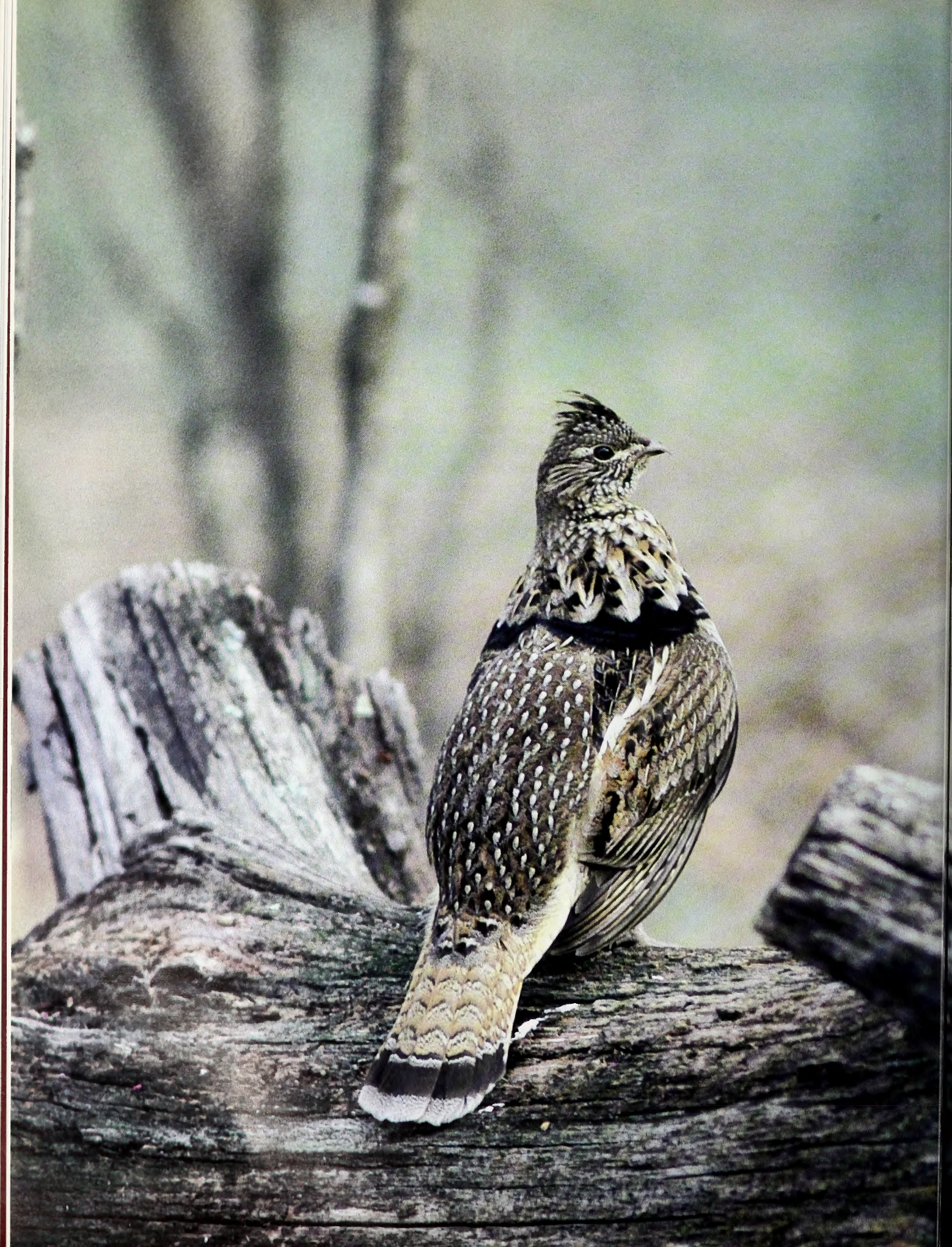
Combine ingredients and add enough water to achieve the consistency of porridge. Cook over hot water until blended. For use at coconut shell feeders or other, more exclusive hanging feeders. A rich mixture that is well liked by birds in winter.

— John V. Dennis,
A Complete Guide to Bird Feeding

More Reading

John V. Dennis, *A Complete Guide to Bird Feeding.* New York: Alfred A. Knopf, 1980.

Roger F. Pasquier, *Watching Birds.* Boston: Houghton Mifflin Co., 1977.



LEONARD LEE RUE, III

Map Your GROUSE

Finding the elusive ruffed grouse isn't easy, but topographic maps can give hunters a "clear-cut" advantage.

by Jay Davies

Rebel, my 8-year-old German shorthair, was onto a bird. Sniffing the ground in staccato breaths, his stub tail vibrating, he moved up the bank in a zig zag pattern. I followed, feeling the adrenaline surge. I was soon sucking in ragged lungfuls of the crisp November mountain air and my heart was beating rapidly. Suddenly Rebel froze, every muscle as taut as a string on a mountain banjo. Cautiously I moved forward.

"Easy Rebel. Whoa. Whoa boy," I cautioned. The bird flushed and I thumbed the safety off as the 20-gauge double swung in a graceful arc. For an instant, everything felt right and I touched the trigger. The hurtling grouse crumpled. "Dead bird. Dead bird," I yelled, but Rebel was already on his way.

"Ol' Rebel does all right," said Bob Satterwhite, my hunting partner, as I took the bird from Rebel's mouth. Then, not wanting to offend me, he added, "And that wasn't a bad shot either." I grinned and scratched Rebel in a favorite spot behind his ear. "Yeah," I said, hoping I sounded nonchalant. I didn't want Bob to think there was anything unusual about the matter. Hey, everyone has an ego.

If all grouse hunters have egos, they couldn't be very fragile. Who else would tote several pounds of walnut and steel up steep mountains while greenbrier and locust thorns scratch your face and tear little holes in your shirt. And maybe, just maybe, you get into a few birds, which most of the time flush so far ahead of your dog that you only hear them. Then when you manage to get a shot, it's through 10 feet of rhododendron leaves or a tree trunk that you'd swear wasn't there when you pulled the trigger.

Maybe that explains why I was so pleased when Ol' Rebel came trotting back with that grouse stuffed in his mouth. But I think I handled it all right. I could have jumped up and down and hollered like a crazy man.

Ruffed grouse are not as numerous in the Tar Heel State as they are farther north, but the population is strong enough in the Appalachians to support a hunting season over four months long and a moderate daily bag limit of three birds. The season limit is 30, but only a handful of hunters ever reach that. Indeed, it takes an exceptional hunter with an exceptional run of luck to regularly fill out the daily limit.

The ruffed grouse is called "king of game birds," and only those unfamiliar with the bird would argue the point. Until recently

***Although ruffed grouse** are often considered northern birds, good populations are found in the southern Appalachian mountains, and the best hunting is found in 6- to 8-year old clearcuts, above 2,500 feet.*

BOB SATTERWHITE

For Jay Davies, *a good dog like Rebel is indispensible. Many grouse hunters prefer Brittany spaniels because they work close to the hunter. Grouse are exceedingly wary, and flush more quickly than quail.*

however, only a few stout souls stomped these mountain ridges in pursuit of royalty. In recent years, the popularity of grouse hunting has increased dramatically.

Grouse hunters have always been a bit evasive when asked where they hunt but nowadays they are absolutely paranoid. One poor fellow I know sneaks out of his house in the wee hours of the morning to go hunting just so no one will follow him.

Traditionally, laurel and rhododendron thickets, overgrown fields, abandoned logging roads and spruce ridges are considered the most productive places to hunt. But one of the best places is a 10- to 15-year-old clearcut. In fact, with modern forestry's increased emphasis on small, prescribed clearcuts, there is a burgeoning supply of promising grouse cover sprouting up all over western North Carolina.

Much of this new grouse cover, however, goes unnoticed. The forests are just so vast it's all but impossible to keep up with all the clearcuts. Two friends of mine, however, have devised a plan that is so simple it's almost obvious. They map their grouse cover.

Monte Seehorn of Gainesville, Georgia and Larry Luckett of Franklin are both avid grouse hunters. Each year, they contact the district rangers of the National Forest Service in the areas they plan to hunt and receive an update on the locations and dates of all clearcuts completed in those districts during the year. This information is free and available for the asking (see "National Forest Ranger Districts" for addresses of the district offices of the National Forest Service in western North Carolina). Although Seehorn and Luckett hunt mostly on National Forest land, there is also excellent hunting on privately owned lands. Information about timber harvest on private land may be obtained from the landowner or by contacting the county ranger with the N.C. Division of Forestry. Of course, you'll need permission from the landowner to hunt private land.

On 1:24,000 topographic maps, Luckett and Seehorn mark in pencil the boundaries of the clearcuts and the dates they were cut. It only takes a few minutes and it provides a ready, visual index to prospective grouse hunting areas.

Not all clearcuts develop into good grouse habitat, however, and those that do may produce grouse for a relatively short period.

"I find that birds begin moving into a clearcut six to seven years after it has been cut," says Seehorn. "Before that, the vegetation is too thick." Grouse like overhead cover, but they need only a relatively open area close to the ground to walk through. After six or seven years, the vegetation next to the ground has been shaded out, but there is still plenty of overhead cover to help hide and protect the grouse from predators. It is usually eight or nine years after an area is cut that it becomes open enough for a man to walk through, however. According to Seehorn, clearcuts usually remain productive

LEONARD LEE RUE, III

Each spring, *male ruffed grouse indulge in a courtship ritual called "drumming" which attracts mates. The birds usually sit on a log and flap their wings to produce a booming noise that sounds like a one-cylinder engine starting up. This noise is audible for considerable distance.*

for grouse hunting between the eighth and 15th year after they're cut, with the prime time being in the nine- to 13-year range.

The age of a clearcut is not the only factor to consider. The minimum elevation for good grouse habitat is around 1,400 feet and the most productive cuts are located at or above 2,500 feet. The aspect or the direction the site faces is also important. Grouse habitat develops quicker on north facing slopes because these slopes are moister and the cover and forage plants, such as greenbrier and wild grapes, grow faster.

"Clearcutting disturbs the normal vegetative succession of an area," explained Luckett. When a forest is young, there is a lot of vegetation close to the ground, but as the forest matures, the taller trees shade out the low-lying plants and cause the grouse habitat to decline. Clearcutting opens up the forest floor to sunlight and the plant community is allowed to re-establish. In a sense it is a way of rejuvenating a forest. Old logging roads, skid trails, abandoned home sites, and areas burned by fire serve much the same purpose and for a time provide excellent grouse covers.

Besides being a portable filing system, topographic maps are also useful in planning a day's hunt.

"I always carry a topo of the area I am hunting, regardless of how many times I may have hunted it before," says Luckett. "I refer to it constantly not only to know where I am, but also so I can mark down any good covers I discover."

Of course, hunting a prime-age clearcut won't guarantee you'll fill your limit of birds or that you will even find birds. Grouse are among our most unpredictable creatures, but with experience, one can achieve some skill at locating them.

In the early part of the season, when the leaves are still thick on the trees, grouse may range anywhere, but are more often found scattered along the ridge tops. During October, clearcuts are not utilized very much, but after the leaves drop, grouse seek out their dense cover.

Often there are skid trails and logging roads snaking through clearcuts and if you stick to them you may be missing out on some good hunting. Sure, it's hard to slug it out through the tangle of greenbriers, black locust, and other species that form an almost impenetrable barrier in most clearcuts. But then, that's why most hunters stick to the roads and also why they pass by a lot of grouse.

Seehorn recalled that on one occasion he and a friend were just getting out of their jeep, when they met another party of hunters coming out of the area he had planned to hunt.

"How'd you do?" Seehorn asked, disappointed.

"Flushed a few," said one of the hunters, "but didn't knock any down. Take my advice, this place ain't worth taking the dogs out of the box for."

The hunters got in their jeep and drove off. Seehorn's friend broke out a sandwich and coffee and tried to decide what to do. Seehorn, however, made up his mind to take

***Dewey Crowe hunts** a ridgetop with Davies. Grouse are often scattered in early fall, but usually move into overgrown clearcuts and other thick cover as it becomes colder. Hunters can check with the Forest Service to find clearcuts that are the right age to produce the best hunting.*

his dog out anyway and walk around a bit, just to stretch his dog's legs. He was barely 30 yards into that clearcut before he jumped three birds. "That was a fine day," recalled Seehorn. "We must have flushed 15 birds in the same area those other hunters had said wasn't worth our time. They missed some great hunting because they stayed on the road."

"Actually, you'll sometimes find birds along logging roads," said Luckett, "and I'll admit I hunt roads too, but if I take the time to get off into the thick of things, so to speak, I'll usually find more birds and often find some good-looking areas I didn't know were there."

One of the best areas I hunt each year I found in just that way. I had just finished hunting an old cut high on a ridge and still had some time before the sun settled behind the ridge. I dropped off the ridge a bit, and went about a half mile, just wandering really, before I stumbled across a particularly pretty spot. It wasn't large — only about 50 yards across — but all the big trees had been knocked over several years ago, possibly by a big wind, and the area was overgrown with a tangle of mountain laurel, greenbrier and grapes.

Rebel got "birdy" almost immediately and locked on point only 20 feet from me. I moved up, gun at the ready and out came ol' mister grouse straight at me. He zipped past, only a foot over my head and plummeted down hill accelerating all the way. "Boom!" "Boom!" barked my 20 gauge. I didn't touch a feather.

Rebel looked real disappointed, but five minutes later I made up for it by dropping a fat rooster he had worked. I took the bird, and as Rebel spit out the feathers I thought I heard him mutter under his breath, "Finally!"

By mid-November, only the tenacious white oak leaves still cling to their branches and grouse begin moving into the clearcuts for cover. Hunting a clearcut is not that much different from most grouse hunting. You work darn hard and hope for a lot of luck. There are a few pointers which may prove helpful, however.

"I usually work a cut systematically, starting at the top and zig zag downhill," described Seehorn. "Speed is very important. If you try to go too fast, you'll push your dog and he'll miss a lot of birds."

Both Seehorn and Luckett hunt Brittany spaniels. "I've seen some good pointers and setters on grouse, but usually they work too far out for me," said Seehorn. Luckett prefers that his dog work no farther than about 50 yards out. "Any farther and it takes too much time to get to them when they point," he says. Seehorn, however, likes his dogs to get out a bit farther, but "only if they're cautious."

Basically you want a dog to work an area thoroughly and yet not get so far ahead that you can't get up to him quickly when he points. Grouse do not sit tight as frequently as quail, and if one sits for your dog at all, be assured it won't be for long. A hunter must move into position rapidly to get a shot. A little trick most hunters use is to fix a small bell to their dog's collar. Because grouse habitat is so dense, the dog is often out of sight and the bell helps the hunter keep track of him. When Ol' Rebel's bell stops suddenly and then tinkles just a bit, I know I'd better find him quickly or else I'm likely to miss out on a shot.

A dog that's a good retriever is invaluable. "Sometimes I'm sure I've missed, but invariably the dog goes out to look, and on more than one occasion he's come back with a mouth full of grouse," says Seehorn.

Monte's philosophy on grouse hunting seems as accurate as any I've heard.

"Shells are cheap," he says, "compared to the physical price you pay hiking up and down these mountains all day."

Just try to make sure you're in the right kind of clearcut, and maybe you'll get to use a few of those shells.

National Forest Ranger Districts

Grouse hunters and others seeking information about western National Forests can contact the ranger for the district they plan to hunt. General information can also be obtained from the headquarters of the Forest Supervisor, National Forests in North Carolina, P.O. Box 2750, Asheville, N.C. 28802, telephone 704-257-4200. The following is a listing of addresses and phone numbers of the district rangers.

French Broad District Ranger
P.O. Box 128
Hot Springs, NC 28743
704-622-3202

Highlands District Ranger
Route 2, Box 385
Highlands, NC 28741
704-526-3765

Toecane District Ranger
P.O. Box 128
Burnsville, NC 28714
704-682-6146

Wayah District Ranger
Route 10, Box 210
Franklin, NC 28734
704-524-4410

Cheoah District Ranger
Route 1, Box 16-A
Robbinsville, NC 28771
704-479-6431

Grandfather District Ranger
P.O. Box 519
Marion, NC 28752
704-652-2144

Pisgah District Ranger
1001 Pisgah Highway
Pisgah Forest, NC 28768
704-877-3350

Tusquitee District Ranger
201 Woodland Drive
Murphy, NC 28906
704-837-5152

Rivers, Grain And The Grist Of History

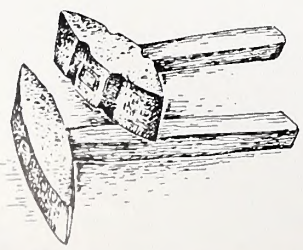
Crumbling dams and abandoned millstones are all that remain of the ancient trade that shaped North Carolina.

by Mark Taylor

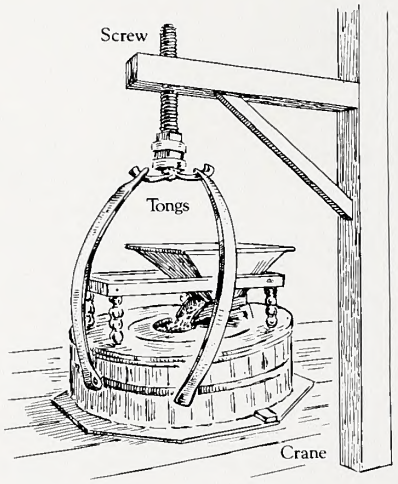
Under the tangle of brambles covering the hillside I thought I glimpsed the rectangular outline of a masonry wall. I paused in midstream, and decided it was worth the trouble to take a look. I waded ashore, left my spinning rod and fishing tackle by a tree, and clambered up the river bank.

From its top I looked down into the remains of a large foundation built of huge granite blocks. The hillside had been cut out and walled with stone to form one side of a building that had once stood a good 50-feet square and at least three stories tall. Fishing forgotten, I spent the next few hours exploring the site and adjacent woodland, also finding the rotting remains of half a dozen cabins nearby.

My find may not rank with the pyramids of Egypt or the ruins of ancient Troy, but to me it was certainly no less interesting. I've always been fascinated by old mills, and had "discovered" Lyon's Mill on the Eno River. According to an 1843 newspaper advertisement in *The Hillsborough Recorder*, this complex had once housed a threshing machine, cotton gin, saw mill, two wool-carding machines for making yarn and thread, a pounding mill for processing linseed oil from flax seed, stones for grinding flour and cornmeal, and a six-room house for the miller. In 1860, 1,200 barrels of flour were ground here, yet within a lifetime the mill and the thriving community it supported had died as completely as any ancient city.



***Mill picks** used to sharpen millstones*



***Crane removed** housing and top millstone for sharpening*

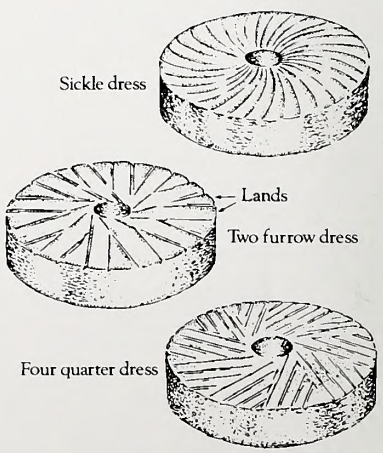
Lyon's Mill is typical of hundreds of mills that covered North Carolina at the turn of the century. Old photographs, popular songs, and paintings usually depict these mills as quaint relicts of a simpler time. However, they served as important, early industrial centers, and the technology developed in 19th-century gristmills forms the heart of modern industry today.

"Most people think only of a simple mill grinding flour or cornmeal when they talk about old mills," said Grimsley Hobbs of Pittsboro. Hobbs has been involved in the restoration and operation of old mills for over four decades, and currently lives in the restored Baldwin's Mill near Pittsboro. "However, a settler could get just about anything he needed at a good mill. Most gristmills, for example, also used their waterwheels to power sawmills, cotton gins, woodturning lathes, or other machinery. In addition, mills also often included a dry goods store, blacksmith shop, or post office."

Development of mills in the New World quickly followed settlement. In 1635, for example, America's first water-powered sawmill was built in South Berwick, Maine, to provide lumber for Boston.

Colonists along North Carolina's flat Outer Banks and coast found few good sites for water-powered mills. They built post-type windmills instead, or used "querns" — which were small, primitive, hand-powered millstones — to grind grain. By the early to mid-1700s, however, the inner Coastal Plain and Piedmont were being settled, and the region's small, turbulent streams and rivers provided many mill sites. The colony encouraged the construction of mills by declaring potential mill sites public property that could be developed by anyone, and exempted millers from certain taxes and military service.

Although milling is an ancient trade — the Romans used water-powered gristmills over 2,000 years ago — the first modern mill was designed by an American named Oliver Evans. In 1795, the Delaware inventor



***Millers favored** different patterns or "dresses" for millstones*

NORTH CAROLINA COLLECTION, UNC LIBRARY AT CHAPEL HILL

***Early gristmills**, such as this one on the Haw River at Bynum, were important community centers. In addition to grinding cornmeal and flour, many mills also housed sawmills, furniture or wood-turning operations, cotton gins, blacksmith shops, and a store or post office.*

published *The Young Millwright and Miller's Guide*. This book outlined a complete, integrated milling system that unloaded grain from ships or wagons, cleaned it using fans and sorting machines, delivered it to the stone, and then sifted, cleaned and bagged the finished product. The waterwheel drove the entire operation by providing power to every floor of the mill — usually three stories — through a network of beveled gears and horizontal and vertical driveshafts. Belts from these driveshafts powered the machinery and conveyors, screw augers, and fans that moved the grain through each process.

"Evans' system was a real breakthrough in industrial development, and quickly

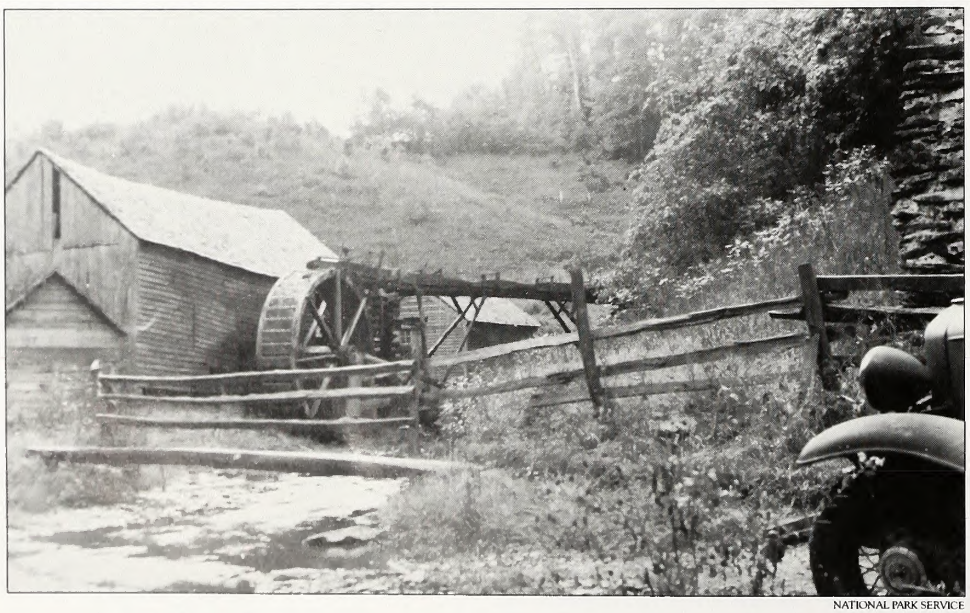
N.C. DIVISION OF ARCHIVES AND HISTORY

***Farmers sign for** cornmeal at an Angier gristmill in 1942. Many water-powered mills were later converted to electricity and powered by water-driven turbines.*

Illustrations by Gary Williams from Exploring the Old Mills of North Carolina *by Grimsley T. Hobbs*

NORTH CAROLINA COLLECTION, UNC LIBRARY AT CHAPEL HILL

A mountain farmer *carries sacks of cornmeal from a Burke County gristmill. Many mills would store a season's worth of grain in individual bins for farmers, who would stop for grain as needed.*



NATIONAL PARK SERVICE

An overshot waterwheel *fed by a flume powered most mountain gristmills, such as the Ogle Mill on Bird's Creek in the Great Smoky Mountains National Park.*

became popular," said Hobbs. "At the time, advertisements said that with an Evans mill all the miller had to do was 'set the mill a'runnin, and go fishing.' That was too good to be true, of course, but most of the back-breaking labor that had given millers a well-deserved reputation for physical strength was eliminated."

Baldwin's Mill, which Hobbs began restoring as a teenager with his father in 1941, is a good example of a 19th-century mill using Evans' system. The mill was built around 1790, and ran until the early 1930s. As with Lyon's Mill, the three-story building is cut into the hillside. This allowed farmers to unload their wagons full of wheat or corn on the top floor while grinding and processing was done on the lower levels.

"There are four basic components in a

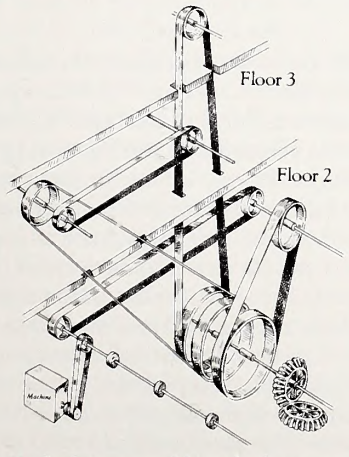
water-powered mill," Hobbs explained, as we walked around the site. "The dam is used to store water in a millpond, which provides the mill's power. This water passes through a sluice or gate in the dam, and falls upon a waterwheel. As the waterwheel turns it powers the entire mill, and the millstones do the actual grinding."

Baldwin's Mill is powered by a small millpond. The millpond is fed by a small creek which runs into the Haw River below the mill, and the dam is built of large granite blocks. Over the past 200 years, the dam has been damaged by floods and rebuilt several times.

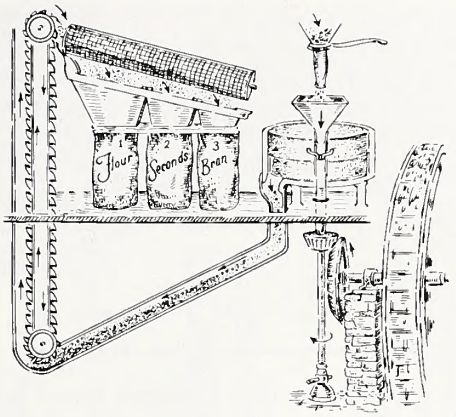
"Mills were powered by the daily flow of the creek feeding the millpond plus the top 4 feet of water in storage," Hobbs explained. "When the millpond was drawn down to the bottom of the gate feeding the waterwheel, milling would stop while the pond refilled. In late fall and winter, when there was plenty of rain and the season's crops were harvested, most mills probably ran nearly every day. In the drier months, many millers farmed or worked on their mills and dams."

The heart of a mill, however, is its grindstones. These were sold in pairs, and an opposing pattern of raised "lands" and grooves was cut into the face of each stone. The stones were housed in a wooden tub, and the bottom stone sat level. Only the top stone moved, driven by a vertical driveshaft which passed through a hole in the center of both stones. The opposing pattern of lands and grooves sheared the grain as the top stone turned, and the grain was ground progressively smaller as it traveled in the grooves out to the edge of the stones — eventually spilling out and being funneled into the machines below which cleaned and sorted the finished flour or cornmeal.

"Millstones weren't allowed to touch, said Hobbs. "That would ruin the stones, and also produced gritty flour or cornmeal.



***Belt drives and** line shafts transferred power to every floor of a mill.*



***The waterwheel moved** grain automatically through the milling and sorting or "bolting" processes.*

However, the top stone could be raised or lowered a fraction of an inch by turning a threaded shaft. In fact, a finely adjusted set of millstones would grab a piece of brown paper in the center, newsprint farther out, and tissue paper at the edges."

Another lever or wheel connected to the gate in the dam controlled the speed of the stone by regulating the amount of water which fell on the waterwheel. Millers wanted good production, but if the stones turned too quickly they would overheat and the flour would have a scorched taste. A good miller was constantly sifting the finished grain between his fingers to feel its texture, and adjusting the height and speed of the stones.

Daily use dulled the stones, however, and periodically they were resharpened. Mounted above the stones on a huge beam was a large crane equipped with a set of iron tongs. The tongs slipped into holes in the opposite sides of the top stone, allowing it to be lifted from its housing, turned upside down exposing its face, and swung clear of the housing and lowered to the floor. Then, the miller or an itinerant millstone sharpener used a set of hammer-like mill picks to painstakingly level and sharpen the faces of both stones. The sharpened top stone was hoisted back on its driveshaft, and was then slowly turned and balanced — much as a car tire is -- by pouring molten lead into a cap in its center or by driving nails into an iron band along its outside edge.

Many mills had two sets of millstones — one for grinding flour, and the other for cornmeal — and different settings were needed for each product. Flour was usually ground on French buhr stones favored by millers worldwide, and were quarried from a small region near Paris. This exceptionally hard stone is not common. Chunks were often used as ballast in sailing ships. In such coastal ports as Baltimore and Charleston, the chunks were assembled into finished millstones. First the rough chunks were shaped into a wheel. Then, a hot iron band was slipped around the outside of the wheel, contracting as it cooled and tightly binding the stone. Softer, one-piece granite stones were usually quarried locally, and used to grind cornmeal.

The swifter streams of the mountains posed different problems for millers. Millponds were rare because most dams quickly washed out. Instead, water was diverted from a stream into a pipe or flume which often led to the top of a large, overshot waterwheel. On smaller streams, however, Norse or "tub mills" were common. These simple mills changed little over 2,000 years, and their use is best documented in the Great Smoky Mountains National Park.

"A Norse or tub mill was used on very small streams, and was powered by a small, horizontal wheel about the size of a large hoop of cheese," said Ed Trout, a Park Service historian who has studied milling in the Smokies. "A flume or chute dropped water onto the blades of this turbine like wheel, and a wooden driveshaft led directly from the wheel to the small millstones housed in a cabin above. A farmer could make just

Visit A Mill

The clanks, whirs and rattles of a working gristmill are not soon forgotten. North Carolina is fortunate in having a number of old-fashioned, working gristmills scattered across the state. An interest in our heritage, in addition to an appreciation for stone-ground meal, is making it possible for many old mills to survive.

An excellent guide to North Carolina mills, and to milling in general, is *Exploring the Old Mills of North Carolina* by Dr. Grimsley Hobbs. The first section of the book details the history of milling, and explains how mills worked. Excellent illustrations accompany the text. The second half of the book is devoted to profiles of the individual mills found in the State. These include a short history of each mill, unique features or historic events, and its location and current use.

Exploring the Old Mills of North Carolina is available at many bookstores or for $10.22 (includes mailing) from The Provincial Press, Box 2311, Chapel Hill, N.C. 27514.

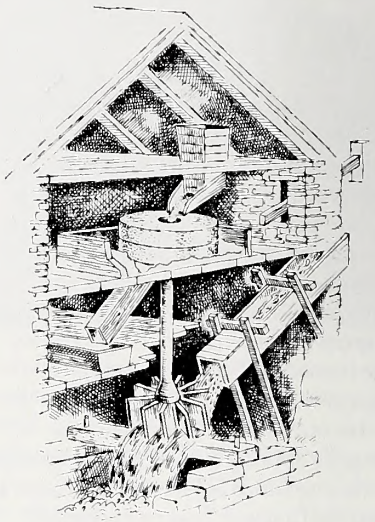
about everything but the grindstones himself, and eliminate long trips to a custom mill and paying a toll or 'share' of the finished flour or cornmeal to the miller."

Tub mills were common in the high mountains. The Park Service has documented 14 of them on LeConte or "Mill" Creek alone. In addition to their small size and simplicity, however, tub mills had one other advantage. They were easy to hide. The Tom Woody tub mill, for example, was hidden on Slab Camp Branch off Forney Creek, and ground corn for making illegal whiskey from 1890 until about 1920.

Small mills began disappearing towards the end of the 19th century. Large, efficient steel rolling mills — which used steel rollers to crush and grind grain into flour — were replacing slower millstones, and huge milling complexes were developing in Chicago and other midwestern cities. Local millers and farmers found it increasingly difficult to compete with cheap, western flour.

The small mills that survived, however, generally depended on grinding cornmeal for local markets. Stone-grinding produces a coarser textured cornmeal preferred in the South, although the finished product doesn't store as well as flour.

"Most of the small mills in North Carolina prospered through World War I because the war created a tremendous demand for food in Europe," said Hobbs. "Many closed after the War, however, because they couldn't compete with larger, more efficient mills. The small mills that survived the Depression usually ground high-quality corn meal for local people using millstones and machinery that had long since been paid for."



***Norse mills** were developed over 2,000 years ago, and are the forerunners of mountain "tub" mills.*

No one knows how many old mills there were in North Carolina. The Division of Archives and History has listed 30 North Carolina gristmills on the National Register of Historic Places, but for the most part these include only surviving historic structures. Most mill buildings, such as Lyon's Mill, didn't survive. The Society for the Preservation of Old Mills maintains state mill lists, and has 150 mill sites listed for North Carolina. Hobbs and others feel that this estimate is probably conservative, noting that on the Eno River alone 32 mill sites have been documented.

"Generally, a farmer was able to travel to the mill and back in a single day," said

Milling Fact and Folklore

Mills were often located at crossroads and river fords, and several skirmishes and battles occurred at North Carolina mills during the Revolutionary War.

A small but bitter battle took place at Lindleys Mill near Graham in 1781 when the Tory leader David Fanning and his men were returning from a surprise raid on the colonial capital of Hillsborough, and were ambushed by local militia and continental soldiers (see "John Braxton's Rifles," Feb. '87 issue). The battle lasted four hours, and casualties were very high.

A less serious incident took place at the nearby Old Mill of Guilford earlier that year, according to *Exploring the Old Mills of North Carolina* by Dr. Grimsley Hobbs. This mill was owned by a Quaker family of millers named Dillon. One night James Dillon had a nightmare in which he dreamed he had badly burned his toe. Upon awakening he told his wife of the dream. She felt it was a bad omen, and warned him not to go to the mill that day.

James ignored his wife's advice, however, and arrived at the mill to find it occupied by British soldiers busy grinding his grain for provisions. The startled soldiers fired a volley of shots at the hapless miller, who jumped behind a tree and was unharmed. A single soldier fired another shot, hitting the only portion of James that was exposed — the very toe he dreamed was burned. The soldiers then took pity on the miller, however, and allowed him to come out and help grind the corn they were stealing before happily riding off to their upcoming defeat at the Battle of Guilford Courthouse.

Oliver Evans, who developed and patented the systems used in 19th century gristmills, later built America's first high-powered steam engine, according to *American Heritage* magazine. He also worked on 80 other inventions, including designs for a machine gun and refrigerator.

Evans was not a kindly, tinkering sort of man, though, and spent most of his later years roaming the countryside, looking for millers to sue for patent violations.

Work in an early mill was sometimes hard and dangerous. Flour weighed 66 pounds per bushel, and was packaged in two, three and four bushel sacks. Even with Evans' system, considerable manhandling was required.

Flour dust was also a problem, and many millers died of emphysema and other lung diseases. Also, if the miller or his apprentice failed to keep grain feeding into the millstones, the stones might strike and spark — setting off a flour explosion that would destroy the mill.

Farmers didn't pay cash to have their grain ground, but paid a "toll" or share of the finished product to the miller instead. The toll usually amounted to 1/8 or 1/12 of the farmer's flour.

Many millers prospered. From medieval times millers had a reputation for double tolling, using false measures, and other dishonest practices. A folk song collected in Durham, and included in the Frank Brown Collection of North Carolina Folklore, sums up the age-old distrust between farmers and millers.

"I tuck me some corn to the
county seat,
Three bushel of corn, three
bushel of wheat.
The miller tuck fur his
millin'-turn
Three bushel of wheat, three
bushel of corn."

NORTH CAROLINA COLLECTION, UNC LIBRARY AT CHAPEL HILL

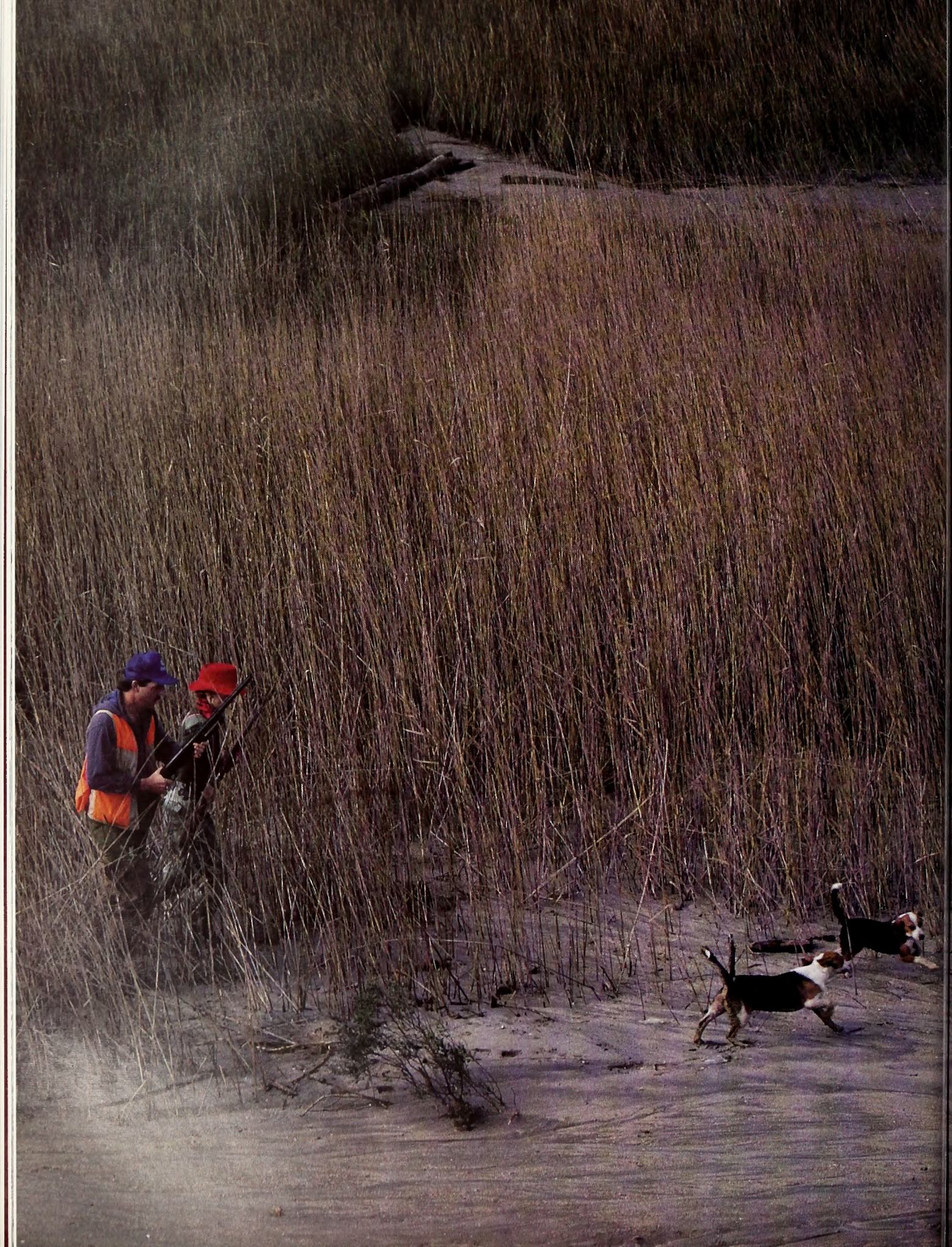
The Palmer tub mill *on Cataloochee was typical of dozens that dotted the Smokies. These mills were usually found on very small streams, and could be built by most farmers.*

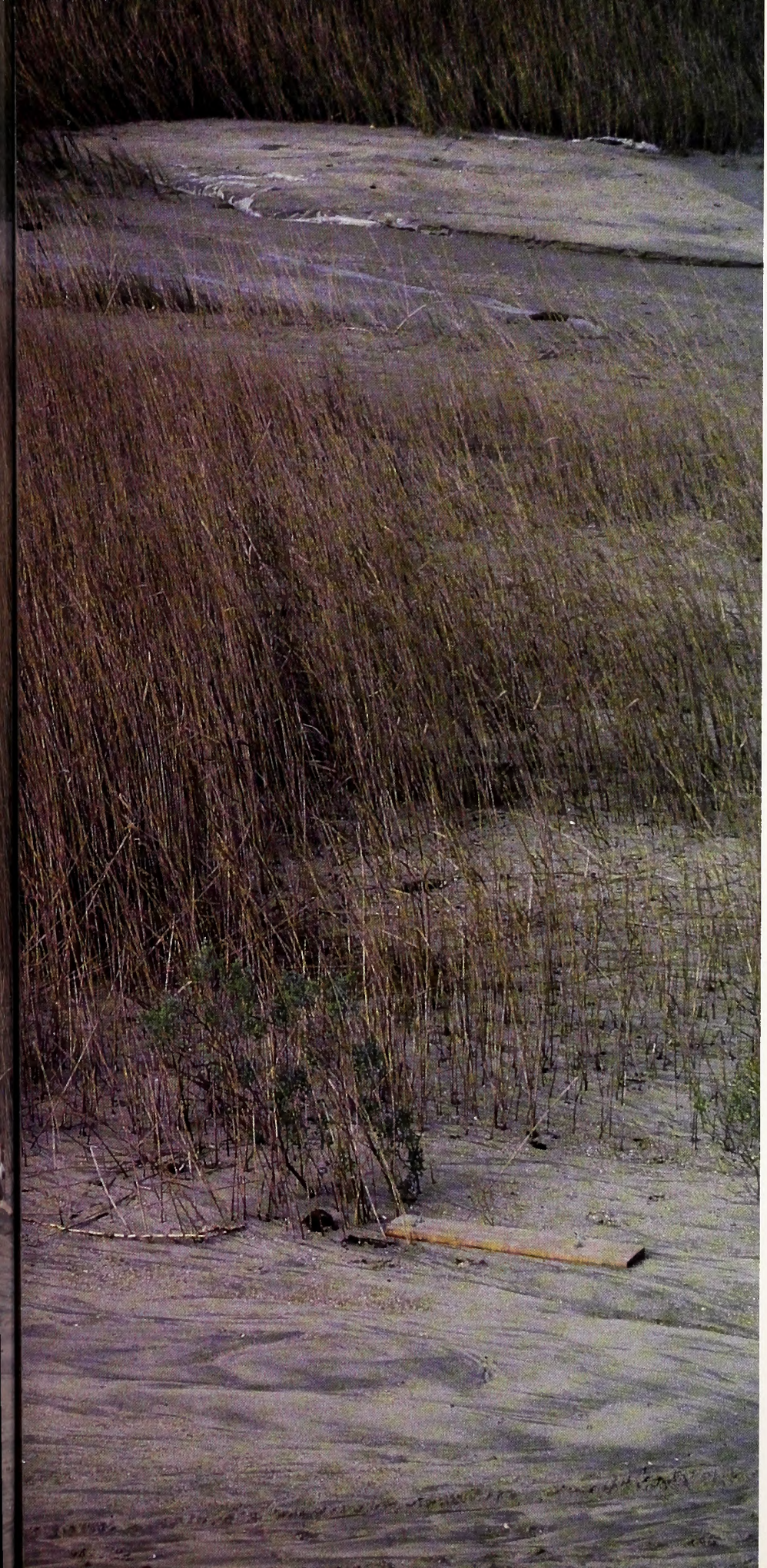
Hobbs. "Usually, that meant a trip of no more than 10 miles one-way by horse and wagon. In areas such as southern Alamance county, which had many mill sites and farms, there was usually a mill every few miles along the rivers. There are certainly hundreds of mill sites in the state, and could be as many as a thousand."

Fortunately, a handful of restored gristmills remain in North Carolina, and most are open to the public. Also, anyone who fishes or canoes our rivers and streams can't miss seeing the remains of old mills, and this only adds to the pleasure of a day spent outdoors. Take the time to look at the broken dams, crumbling foundations, and occasional millstones lying half-buried in the river bottom. All of these offer tantalizing glimpses into a past that is largely forgotten but barely gone. ⊠

NATIONAL PARK SERVICE

Uncle Ike Bradley *carves a horizontal tub wheel for a recreated tub mill located in the National Park.*





Bunnies On The Beach

Coastal islands may not seem like typical hunting grounds, but they're one of the prime spots to hunt marsh rabbits.

written and photographed by Joel Arrington

The Cape Fear is a mighty river at its mouth near Wilmington and Southport. Ships of awesome tonnage ascend it to the state port there and small craft ply its brown waters seasonally for fishing and hunting.

Dredges maintain required channel depths for navigation, throwing the spoils up to create islands or to enlarge existing ones. In the normal course of plant succession, grasses and woody brush seed themselves and within months birds and small game call the islands home. Sea birds nest, raccoon tracks are common along sandy beaches and rails sneak furtively through the marsh grasses.

Paul and Brooks Pearce are among the handful of Wilmington-area residents who hunt waterfowl and marsh rabbits on Cape Fear River islands. When they invited me

***Jim Morgan** and Brooks Pearce break out of the grass close behind the beagles on a Cape Fear River island. Marsh rabbits are fairly common on the unsettled portions of some barrier islands and many small islands created from dredged sand (spoil) along the coast.*

to join them and other guests to run the lowland bunnies with beagles, I was glad to accept.

From the highest crest of fresh spoil on Snow's Marsh Island, I could watch the hunters at a distance not far behind small dogs and hear shouted encouragement and the dogs' yelps and yowls. In waders or hip boots, the hunters were often just yards behind beagles that appeared and disappeared in heavy cover. Occasionally I would catch only glimpses of red and orange hats and the tip of a dog tail waving like a flag above the vegetation.

Brooks Pearce and Jim Morgan pushed through toward the edge of thinning grass. From a high vantage point I could see the game whole — the hunters, the dogs, the prey. I saw the dark rabbit when it emerged only yards ahead of the dogs onto smooth sand, not running flat out, but just deliberately hopping across the clearing to a dense growth of *Spartina* and myrtle where it disappeared and escaped without dogs or hunters ever having seen it.

Later, another was not so evasive. When a dog pushed it hard, it left the high myrtle to dash across a patch of sparse grass. Paul Pearce dispatched it with a lightning snap shot.

I came down off the spoil pile to examine the rabbit. Pearce said the most obvious difference between marsh rabbits and cottontails was the underside of the tail.

"If it's not pure white," he said, "it's a marsh rabbit — *Sylvilagus palustris*. Most hunters readily recognize the difference."

He said marsh rabbits are strong, willing swimmers, often taking to the water to evade hunters and other predators. This one had long toes with dense hair between them so that the feet appeared to function well as paddles.

Standard references indicate cottontails are found throughout Canada and the United States, but that two species, the marsh rabbit and the swamp rabbit, are confined to the Southeast. In North Carolina, according to Carl Betsill, Small Game/Migratory Bird Program Coordinator for the Wildlife Resources Commission, there are two species of cottontails in the state — the New England and the Eastern. A swamp rabbit was reported in Clay County 30 years ago, but there has not been another since.

"It's doubtful if the species still occurs in the state," he said.

The marsh rabbit, on the other hand, is common in eastern North Carolina.

"As you go east from Raleigh," Betsill said, "the percentage of marsh rabbits among cottontails in the hunter's bag increases to as much as one-half in some counties." The species is never found far from water and is associated with floodplains, bottomlands, swamps and marshes — and coastal islands.

***Sand dredged from** channels offers a high vantage over this marshy island. Thickets of myrtle and various grasses offer food and cover for marsh rabbits and other wildlife.*

Like the cottontail, the marsh rabbit will feed on whatever is available, but it is adapted to lowland plant species. It feeds extensively on the leaves and twigs of woody plants, although the major portion of its diet may consist of both terrestrial and aquatic herbaceous plants. *Palustris* also will dig and feed on rhizomes and bulbs.

Betsill said preliminary results of studies in the Penny Bend Rabbit Research Area in the Falls Lake Project near Durham show an increasing percentage of marsh rabbits over a period of years as the reservoir site was flooded and the area became more aquatic.

Like all rabbits, *Palustris* is fecund. Research shows it may breed four or five times between February and September, producing several young in each litter. As a species, it tends to fill available habitat quickly.

"Unlike cottontails, marsh rabbits are not dependent on farmland for habitat, which has been declining in this state for 50 years," Betsill said. "So have cottontails."

While marsh rabbits are amenable to management, the Wildlife Resources Commission has not seen the necessity to assist the species.

"Where there is suitable habitat," Betsill remarked, "they are doing well, but overall, because we are losing wetlands, the population is declining."

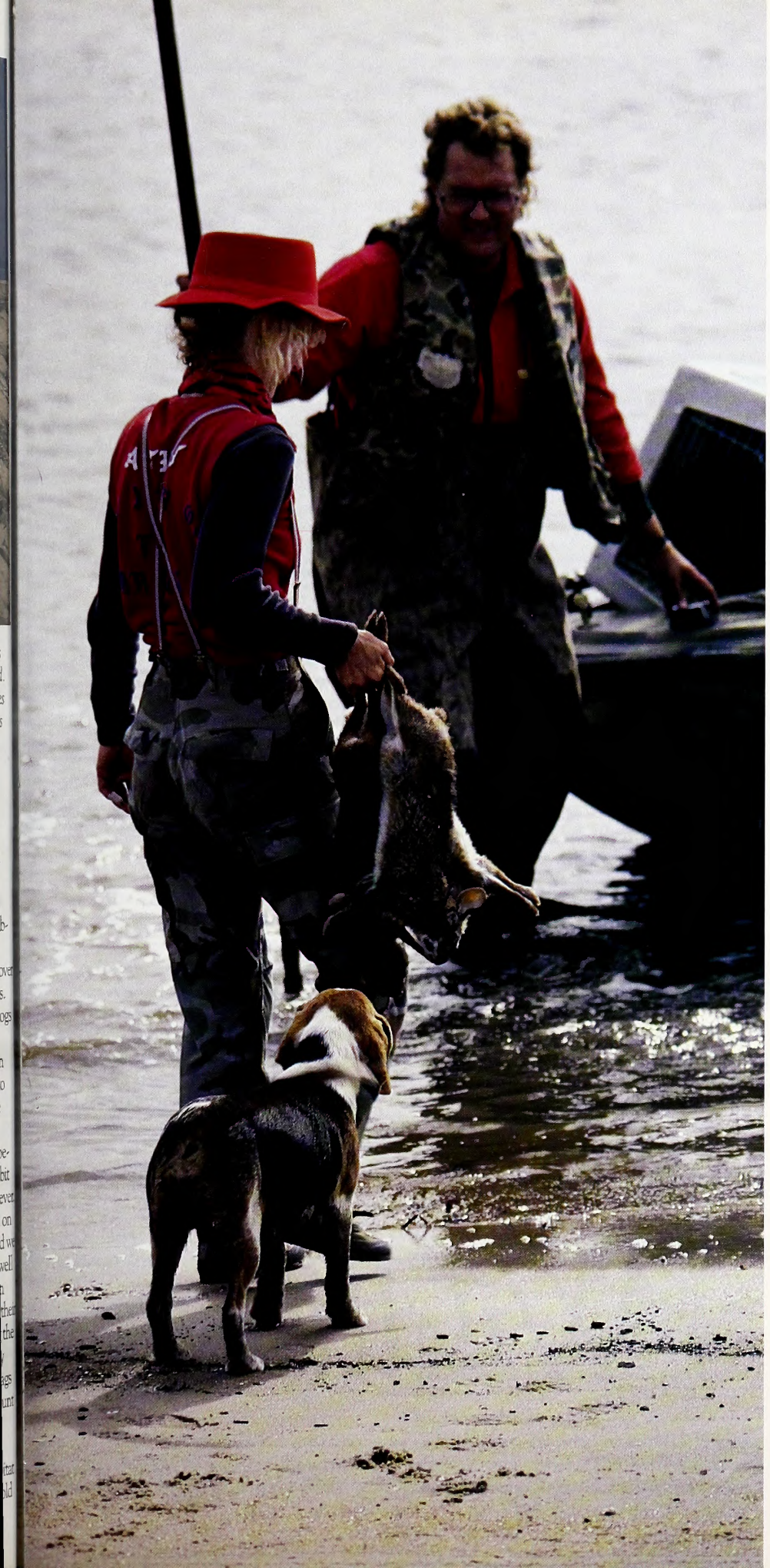
While its future is cloudy, its numbers at present leave little to be desired — at least in many eastern North Carolina locations. Nevertheless, the marsh bunny does not please all hunters.

"They are not open country runners," Betsill said. "They tend to run a little and squat, which does not endear them to hunters who want a good race. If you like to hear dogs really open up and drive a rabbit hard, you want to run a cottontail."

On North Carolina's coastal islands, cover may be limited, but dense where it occurs. Several rabbits will use it, so that when dogs begin to work it, the rabbits mill about, crossing each other's trails, but never run very far. This makes it difficult for dogs to sniff out a single trail and follow just one rabbit.

If you get a kick out of seeing rabbits befuddle beagles, you will enjoy marsh rabbit hunting. Often the dogs get it right, however. We enjoyed seeing the Pearce pack work on the Cape Fear islands that November and we bagged a few rabbits. Hunts turned out well on barrier islands near Carolina Beach in years past when Dan and Lane Holt and their guests used to hunt twice a week during the season. The dogs raised Cain, apparently had as good a time as the hunters, and bags of four or more rabbits on a morning's hunt were not uncommon.

Low woodlands and their edges anywhere on the Coastal Plain are likely habitat for marsh rabbits. Barrier islands may hold



***Brooks Pearce** hands a pair of marsh rabbits to her husband, Paul, after a successful hunt on a spoil island. Beagles seem to enjoy this kind of hunting as much as their owners, even the boat rides to and from the islands.*

huntable populations, but not all do. Publicly owned islands include some within North Carolina's two national seashores. Rabbit hunting is forbidden within the Cape Hatteras National Seashore, but it is permitted in season anywhere within the Cape Lookout Seashore, except near the lighthouse and other special-use areas. A spokesman said nowhere were there sizable rabbit populations but that hunters sometimes found them in satisfactory numbers on Shackleford Island.

Some of the lower Cape Fear River islands are privately owned, others are in public ownership. Merely because an island has fresh spoil on it does not mean it is publicly owned. To be sure you will not be trespassing on a particular island, you should check county tax records. Hunters must obtain permission to enter private property.

A spokesman for the North Carolina Department of Administration's State Property Office said no objection would be raised to rabbit hunting on state owned property provided it posed no threat to dredge operators who may be working nearby. The U.S. Army Corps of Engineers has easements permitting their use of the islands, but no ownership rights. A designated estuarine sanctuary in the mouth of the Cape Fear permits hunting, according to a spokesman for the N.C. Division of Marine Affairs. Hunters should exercise common sense and prudence in hunting near workers or other recreational users. That dictates using shotguns exclusively, rather than rifles.

Pearce recommends #6 to #8 shot and an open bore. Most shots are quite close. The smaller gauges are adequate if you can hit with them. Targets are often just brown flashes as the game darts between cover.

With what appears to be an ineluctable decline in the state's wetlands, marsh rabbits, like cottontails, will play an ever smaller part in North Carolina hunting. Until we replace the plug on drainage, this species and the recreation it provides will continue a downward spiral. For the foreseeable future, however, marsh rabbit populations are good, and regulated hunting does them no harm. That's good news to sportsmen who may want to test their shooting reflexes against this fine and furtive target. ⊠

UNIVERSITY OF WISCONSIN-MADISON ARCHIVES

With chaps, vest *and hat, Leopold looked the very image of an Arizona cowboy in 1911. The young forester's experiences in the Southwest taught him his first lessons in wildlife ecology. The region teemed with wildlife, yet game was declining.*

The Father Of Wildlife

Aldo Leopold may be best remembered for *A Sand County Almanac*, but more important, he taught us the ethic that guides modern wildlife management.

by Lawrence S. Earley

Shortly before he died, in the converted chicken house that was his weekend and vacation retreat, Aldo Leopold — sportsman, conservationist and prophet — wrote some of his most despairing words about the movement he had championed for so long:

> *"Conservation is getting nowhere because it is incompatible with our Abrahamic concept of land. We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect. There is no other way for land to survive the impact of mechanized man . . ."*

Yet, strangely, the book in which these words eventually appeared is not known as a morbid summation of the failures of conservation. Indeed, *A Sand County Almanac*, published in 1949, the year after his death, is one of the bibles of the conservation philosophy — arguably the greatest testament of conservation principles by any American since Thoreau. Though Leopold had ample reason to feel frustrated after a lifetime of struggle to change the way we think about wildlife, the legacy of his book — and his life — is overwhelmingly hopeful.

This year, the centennial of his birth, sportsmen and other conservationists have been taking the opportunity to reexamine the roots of the movement that Aldo Leopold helped to shape. There is no better way to appreciate Leopold's impact than to read his greatest work. But Leopold's life was more than a single book. More than most writers, Leopold labored long and hard in the public arena as an advocate of conservation principles. He was a forest supervisor, an administrator, a teacher, a commissioner with the Wisconsin Conservation Commission. He co-founded the Wilderness Society and served as president of the Ecological Society of America. He wrote articles, monographs and books. The policies he fought for were strange, even radical at the time, often earning him hostility. Today they are fundamental to our understanding of wildlife.

ROBERT McCABE, UNIVERSITY OF WISCONSIN-MADISON ARCHIVES

***The older Leopold** in 1940 was revered as the author of the influential* Game Management. *The 1933 textbook was one of the earliest summaries of the principles of the young science.*

Leopold was born in Burlington, Iowa, on Jan. 11, 1887, forming his first impressions of nature and wildlife on the banks of the Mississippi River. His family was well-off, sending him to one of the foremost prep schools in the country, Lawrenceville, and, in 1906, to Yale. At Yale, he began studies in forestry.

Forestry at that time was a very young science, but under the considerable influence of Gifford Pinchot, who headed the brand-new U.S. Forest Service, it was beginning to flex its muscles. Pinchot believed that forests, like crops, were a renewable resource, and that trained foresters could harvest the wood while guaranteeing the survival of the forest. These ideas of a "renewable resource" would influence Leopold's own ideas about wildlife management.

After Yale, Leopold joined the Forest Service in 1909 and was assigned to the Southwestern territories of Arizona and New Mexico. By 1912 he was named supervisor of the Carson National Forest in New Mexico, remaining in the Southwest until 1924 when he moved to Madison, Wisconsin, to take over as director of the Forest Products Laboratory, the principal forest research institution of the Forest Service. Leaving the

ROBERT McCABE, UNIVERSITY OF WISCONSIN-MADISON ARCHIVES

***Aldo Leopold** was a tireless field biologist as well as a sportsman. His ideas of game management developed from extensive field experience. His surveys of game populations helped pave the way for new thinking on the importance of habitat to wildlife.*

U.S. Forest Service in 1928, he performed game surveys for the Sporting Arms and Ammunition Manufacturers' Institute until 1931 when the Depression undercut his funding. In 1933 he published possibly his most influential book, *Game Management*, and in the same year was given the chair of game management at the University of Wisconsin in Madison. He would remain there until his death.

Early in his career, Leopold began his search for a science of game management. It is difficult to realize today that when he first began to wrestle with these problems, the foundations of game management had yet to be laid. Today, ideas such as the carrying capacity of habitat or the role of predators in controlling wildlife populations are commonplace. Wildlife managers take them for granted; student biologists routinely study them in basic courses. In Leopold's day they were all but unknown.

The theory of wildlife management was clear. Taking his lead from Pinchot, Leopold and others saw wildlife as a "crop" grown on the land. "Game management," he wrote, "is the art of making land produce sustained annual crops of wild game for recreational use." He disagreed with the thinking then common among conservationists that hunters would soon have to put their rifles down because of the scarcity of game. "The central thesis of game management is this: game can be restored by the *creative use* of the same tools which have heretofore destroyed it — axe, plow, cow, fire, and gun." Game management would restore wildlife populations in healthy numbers.

But if the theory was clear, the methods of wildlife management were anything but clear. Indeed, many of Leopold's early ideas proved to be deeply flawed. Early on, for example, he subscribed to the then-common belief that wildlife populations could be boosted by controlling predators. The best way to ensure more deer, he believed, was to kill the wolves that preyed on them. In time he realized that predators played an important role in maintaining and controlling wildlife populations. He dated this important change in thinking to the time he shot a wolf and watched "a fierce green fire dying in her eyes," as he wrote later in "Thinking Like a Mountain." That experience, and his experiences in the Southwest were to make him aware that worse than wolves were too many deer. "I now suspect that just as a deer herd lives in mortal fear of its wolves, so does a mountain live in mortal fear of its deer. And perhaps with better cause, for while a buck pulled down by wolves can be replaced in two or three years, a range pulled down by too many deer may fail of replacement in as many decades."

By 1933, when he published *Game Management*, codifying for the first time the principles of wildlife management that he had been working out, he had recognized the insufficiency of many of his early ideas. Now he recognized that habitat was the key to wildlife. Wildlife populations could better be controlled by improving the carrying capacity of the habitat rather than increasing sheer numbers of game. Stocking too many deer might result in overbrowsed habitat and a depleted resource.

It was an ecological approach to game management, an approach that sees populations of animals in a dynamic balance with their habitat, their numbers controlled by predators — including hunters — disease and food supply. It was an approach that led to some of his most profound thinking about wildlife and the land.

Though one of the most practical of thinkers, Leopold was also one of the most philosophical on the subject of wildlife and wilderness. He looked at wildlife management from both ends — the maintenance of fish and wildlife populations and the recreational enjoyment of them by hunters, photographers, bird watchers and others. He fervently believed that all outdoor experiences were not alike. "The objective of the game management program is to retain for the average citizen an opportunity to hunt," he wrote in *Game Management*. "As already pointed out, this implies much more than the annual production of a shootable surplus of live birds to serve as targets. It implies a kind and quality of wild game living in such surroundings and available under such conditions to make hunting a stimulus to the esthetic development, physical welfare, and mental balance of the hunter." He protested against gadgetry in hunting and fishing, against the automobile that reduced the wilderness experience ("Drums along the Mohawk are now honks along the rivers of the world"), and against recreationists who flew from one natural spot to another in an

UNIVERSITY OF WISCONSIN-MADISON ARCHIVES

"The shack," *Leopold's weekend and vacation retreat outside of Madison, Wisconsin, provided the sort of tranquility that he needed for his writing. Written at the shack, the nature essays of his best-known book,* A Sand County Almanac, *continue to influence conservationists.*

orgy of restlessness ("The weeds in a city lot convey the same lessons as the redwoods").

In his later years he grew even more philosophical about something he called "the land ethic." Most of his thinking on this subject was done in a late essay of the same title that concluded the original edition of *A Sand County Almanac*. It was clear to him that the biggest stumbling block to conservation was the reluctance of people to see land as anything more than disposable property. Leopold believed that humans were only one part of the web of living relationships on the land.

Land, he wrote, was more than a commodity to be bought and sold. A landowner had a special relationship to his land, a relationship that was ethical as well as economic. "All ethics so far evolved rest upon a single premise: that the individual is a member of a community of interdependent parts." An early ethical code like the Ten Commandments governs man's relations with his fellows; a later ethical code, democracy, governed the relations of a government with its people. But another ethical code yet to be developed was "the land ethic." "There is as yet no ethic dealing with man's relation to land and to the animals and plants which grow upon it . . . . The land relation is still strictly economic, entailing privileges but not obligations." This was a necessity, Leopold believed, for the harmonious use and understanding of the land he envisioned. "In short, a land ethic changes the role of Homo sapiens from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members, and also respect for the community as such."

The difference between Leopold and many scientists today is that Leopold wanted to communicate with the common man, and he used the mother tongue to do it. Scientists, with some few exceptions, write for other scientists. Leopold was an exception, but he was a writer long before he wrote books. He kept journals as a young man, and is reported to have written 10,000 letters, mostly to his mother, while at school. During his professional life, he wrote numerous articles in professional and popular journals, developing ideas that later were enshrined in his books. He wrote in a sinewy and idiosyncratic prose style that had no rival among naturalists since Thoreau.

> *"There are two spiritual dangers in not owning a farm. One is the danger of supposing that breakfast comes from the grocery, and the other that heat comes from the furnace."*

> *"[My bird dog] is the prospector of the air, perpetually searching its strata for olfactory gold. Partridge scent is the gold standard that relates his world to mine."*

Aldo Leopold's vision of the harmonious relationship between humans and the land that supports them is a vision that animates many in the conservation community today. We salute Leopold on his 100th birthday because he nurtured this vision and voiced it with a passion and poetry that was both eloquent and rare. ⊠

NOMADS Of The Open Sea

At certain times of the year, North Carolina's offshore waters host a great variety of marine birds.

by David Lee / photography by James F. Parnell

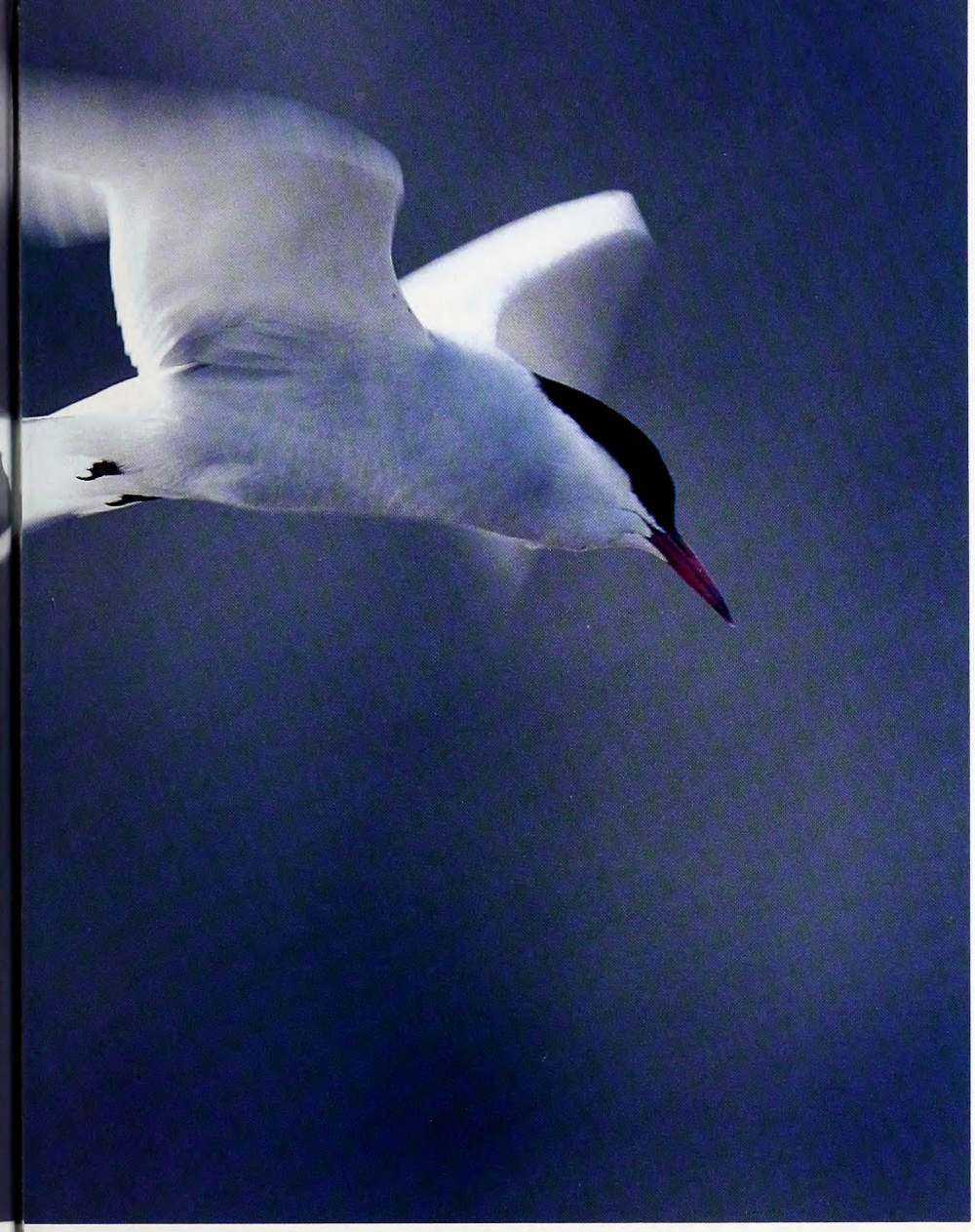
The wave crests were awash in white foam adding a distinctive salt taste to the northeast wind. Another rough trip into the Gulf Stream. The boat's temperature gauge digitally blinked "72.3, 72.8, 73.1," and in less than 50 yards the sea's surface temperature climbed to 78.4°F. We were in an area of sharply changing temperatures. The boat was straddling a place where two strong currents, each running with a different force, collided. A pod of porpoises appeared, swam alongside our bow and then left.

We followed this edge northward knowing that marine invertebrates and small fishes would be caught up along the current lines and above them, we hoped, foraging seabirds — the focus of our research. Within minutes we started seeing numbers of storm-petrels, and in the course of a few miles we passed terns resting on floating boards. Strong-flying jaegers patrolled the edge. Shearwaters, feeding on fishes concentrated in the floating refuges, swam and dove around the sargassum weed. In an hour and a half we logged more sightings of seabirds than we had in the previous 5 hours. We recorded 14 species and about 400 individuals. Our observations were similar to the other 170 excursions we have made off the North Carolina coast. The species composition varies seasonally, but the patterns of bird concentration are generally the same.

Over the past eight years, the research staff of the N.C. Museum of Sciences has made intensive field studies of the seabirds off the North Carolina coast. We have found 30 pelagic species, six offshore species and 17 coastal bird species, probably one of the richest assemblages of marine birds in the North Atlantic. By chartering a boat for a spring trip to the edge of the continental shelf, for example, one might see gannets from Nova Scotia; phalaropes and jaegers from the Arctic tundra; storm-petrels that nested during the austral summer on Antarctic islands; and various shearwaters from the Mediterranean Sea, the Caribbean Sea, the Canary Islands and southern South America. Intermixed would be gulls and terns that nest in colonies on various small coastal islands of the central Atlantic states.

This seemingly strange assemblage of seabirds off the North Carolina coast is no accident. Because of its latitude, the state receives a good representation of tropical and subtropical species during the warmer months and cold-water birds during the winter. The close proximity of the Gulf Stream allows some warmwater-dependent species to occur throughout much of the year, while the cool waters of the southward-flowing Labrador current provide winter haunts for those of northern latitudes. Where the two currents meet is an area of churning waves and small upwellings of cool water rich in oxygen and nutrients. These conditions attract birds from all over the North and South Atlantic, and they also make North Carolina's offshore waters one of the best deep-sea sport-fishing areas in North America.

The predictability of prey populations not only draws birds from throughout the Atlantic, but causes many species, which should be rare or absent in this latitude, to occur regularly — often in abundance. For example, the greater shearwater is a southern hemisphere species of sub-Antarctic islands that typically "winters" in the cool waters off Canada, where long summer days produce vast plankton blooms that support extensive food chains. Recent offshore studies, however, have shown that a fair number of subadult greater shearwaters "winter" off the North Carolina coast, being present throughout our summer not just in migration as previously believed. At the



***The Arctic tern** is a rare spring and fall migrant that can be seen at sea passing the North Carolina coast. It nests in the high Arctic, but lives at sea during its non-breeding season.*

same time many tropical and subtropical seabirds from the Caribbean find our local waters to be much more productive than the warm oxygen- and nutrient-deprived seas near their nesting grounds. Thus, impressive assemblages of species such as Audubon's shearwaters, bridled terns, and black-capped petrels occur regularly along the edge of the Gulf Stream near the North Carolina coast. To the north they are rare or absent; to the south, oceanic productivity is so limited that the birds seldom linger.

Different bird species have such specific requirements for feeding that they stratify into rather predictable zones. These zones shift from day to day and season to season with changing winds, current edges and surface-water temperatures; but the patterns of distribution for particular species groups are generally the same.

Our study of terns, for example, shows that least terns are nearly always in sight of the beach, as are common terns once the migration period is over. Locally nesting sandwich terns commonly feed up to 15 miles from shore, while royal terns, which nest at the same sites, at times commute up to 50 miles out to sea to fish. In North Carolina, tropical terns (which do not nest in our area) such as bridled and sooty terns are seldom found within 20 miles of land except where the Gulf Stream comes closest to Cape Hatteras, and probably 90 percent of all bridled terns observed are within a mile of the Gulf Stream's edge. Seabirds are opportunistic, however, and at times when large numbers of prey species concentrate and are driven to the surface by feeding predatory fishes, the zones temporarily break down.

The arrival of birds is seasonal — there are distinct summer residents and visitors, winter residents and visitors, and migrants. Some species appear irregularly. At certain times in the early spring and late fall, however, summer and winter residents, migrants, and accidentals may all appear simultaneously.

Summer Residents — Summer Visitors

From May to November certain species occur regularly in our offshore waters. The birds discussed here do not include the various gulls and terns that nest along our beaches, but they too are often encountered far at sea.

Cory's shearwater *(Puffinus diomedea)*. This large shearwater is one of the most common and regularly encountered seabirds. It is not unusual to see flocks of hundreds foraging for fish and squid or resting on the surface. A large percentage of the birds seen in North Carolina's waters are immature (probably 1 to 7 years old), for the adults nest during the summer on the other side of the North Atlantic. Their nesting islands are in the Mediterranean Sea and on small islands far off the European coast (Madeira and Canary Islands for example). In flight they are one of the most graceful of our seabirds, and their long arcing glides allow them to cover miles of ocean effortlessly in search of food. Surprisingly little is known about their life history, but it probably takes them many years to mature. Like other seabirds, in any given year several subadult age classes are present simultaneously off our coast.

Greater shearwater *(Puffinus gravis)*. This shearwater annually migrates from the cool south Atlantic seas to "winter" in the cool waters off New England and Canada. Nevertheless, fair numbers remain off the Carolina coast throughout the summer while the majority migrate northward, often following migrating schools of blue-fin tuna. Similar in size and build to the temperate zone Cory's shearwater, the greater shearwater is not as graceful a flyer. The food habits of both birds are similar and they are often seen feeding and flocking together, although this species feeds more on squid. Greater shearwaters are frequently associated with schools of feeding yellow-fin tuna, attracted to the prey items the tuna chase to the surface. While fishing-boat captains appreciate the service these birds provide in indicating fish schools, they are not enchanted by the birds' persistence in snatching trolling baits.

Audubon's shearwater *(Puffinus lherminieri)*. This shearwater, which is considerably smaller than the Cory's or greater shearwater, is a subtropical species that nests throughout

A high cliff nester *in Canada, the northern gannet winters in North Carolina waters from December through late April. Like other seabirds, gannets stay at sea except when nesting.*

much of the Caribbean Sea and the Bahamas. When feeding, it is usually seen swimming among patches of floating sargassum "weed." Here it hunts small fishes and crustaceans that hide in the algae. Like many of the tropical and subtropical seabirds that occur off North Carolina, this species reaches its northern limit of regular occurrence here. Sightings of these birds north of the Hatteras area are mostly of individual wanderers and not major feeding flocks.

Wilson's storm-petrel *(Oceanites oceanicus)*. The storm-petrels, or Mother Carey's chickens, are one of the most conspicuous features of the open sea. Of the numerous kinds of storm-petrels known from the world's oceans, the sparrow-sized Wilson's is by far the most common. In fact, it is probably the most common species of bird in the world. From mid-April through early October there are few places in the open sea where one or more of these small birds is not in sight. They fly just above the waves using their long legs to help keep them above the surface while feeding. Small amounts of fish oil thrown overboard will attract scores of them within minutes as they locate potential feeding areas with an incredible sense of smell. These birds nest on sub-Antarctic islands and migrate to the North Atlantic for their "winter." The small, seemingly delicate appearance of storm-petrels is misleading. Individuals may survive for more than 50 years, and unlike some other seabirds, they are seldom driven to land by violent seas.

White-tailed tropicbird *(Paethon lepturus)*. This species occurs with some regularity south of Hatteras from June through September. The closest nesting population is in Bermuda and breeding colonies are common throughout the Caribbean. North of the Carolinas, this bird is normally encountered only after tropical storms. Related to pelicans and cormorants, tropicbirds hunt from high above the sea, plunging for fishes. Flying fishes seem to be their most frequent prey. The long, distinctive streamer-like central tail feathers and the birds' habit of following boats make them well known to local fishing captains.

Red-billed tropicbird *(Phaethon aethereus)*. This tropical species was not expected to occur regularly in the western Atlantic north of the Caribbean region. Recent research of offshore bird life, however, has shown the bird is present perhaps on a regular basis. In size and appearance it resembles the white-tailed tropicbird. The diagnostic field characters are on their upper surfaces while tropicbirds are usually viewed from below. Thus, many earlier North Carolina sight records of tropicbirds were simply assumed to be white-tails because they were the only species expected in the area. To further complicate the situation, bill colors and markings of both species vary with age, and information in field guides is not adequate to allow specific identification of many individuals by sight alone.

Magnificent frigatebird *(Fregata magnificens)*. A tropical species, occurring sporadically from May to September, the frigatebirds wandering north to North Carolina are mostly immatures. Most records represent birds seen flying along the coast and there are few records from far at sea, even though frigatebirds are notorious for long-distance, open-ocean travels.

Bridled tern *(Sterna anaethetus)*. This dark tern is a common resident through the warmer months. Like many of our seabirds, most individuals in our area are subadults. These tropical terns nest throughout the Caribbean islands. Like most terns, they feed mostly on small surface-dwelling fishes and are often seen resting on floating boards in the Gulf Stream.

Sooty tern *(Sterna fuscata)*. Sooty terns have similar feeding and nesting habits, but unlike bridled terns occur irregularly north of southern Florida. Their only periods of abundance along the north Atlantic coast are associated with extensive tropical storms.

Winter Residents — Winter Visitors

From November through May, these wintering seabirds can be found in the state's offshore waters.

Northern fulmar *(Fulmarus glacialis)*. Fulmars have been rapidly expanding their population and range since the 1950s. This is generally believed to be a direct result of their exploiting waste from commercial fishing vessels. The first record of fulmars wintering as far south as North Carolina was in 1973. By the early 1980s fulmars have come to be one of the most common of our wintering birds found at sea, with hundreds to be seen on a single day.

Manx shearwater *(Puffinus puffinus)*. The winter status of this northern European nesting shearwater is not clear, but individuals seen off our coast in late December suggest that at least they occasionally take up local winter residence here. It is a boreal counterpart of the tropical Audubon's shearwater and only slightly larger.

Gannet *(Morus bassanus)*. Adult gannets are common winter residents from mid-December through late April. Additionally, small numbers of the darker plumaged juveniles and subadults can be seen from mid-October to late May. Most records are of birds from shore, where occasionally a thousand or more can be seen fishing within a few hundred yards of the surf. This seabird is not often encountered far offshore. During the summer, the birds nest on high oceanic cliffs in Canada.

Black-legged kittiwake *(Rissa tridactyla)*. This white pelagic gull is common off our coast from November through March. It is a medium-sized bird that feeds on marine crustaceans and small fishes far at sea, not scavaging like most of our other gulls. The

***The black-capped petrel** (left) is a rare and mysterious species, thought extinct several decades ago. It nests in the mountains of Haiti and Cuba but its only known major feeding grounds are off North Carolina. The magnificent frigatebird (below) appears along the coast sporadically from May through September, flying north from its tropical nesting grounds.*

young birds are distinctively marked with a black collar.

Alcids. Three species of northern diving birds are known from the state. All occur sporadically. They vary in size from the small 8-inch dovekie *(Alle alle)* to the razorbills *(Alca torda)* and thick-billed murres *(Uria lomvia)*, which are twice its size. Unlike most other seabirds, these are seen mostly from the beach, and they probably do not occur regularly in the deeper offshore waters.

Spring and Fall Migrants

In addition to the wintering and summering seabirds, there are others that are migrants, passing through North Carolina's offshore waters on their way to and from their nesting areas. Birds in this category include Procellariformes such as sooty shearwaters *(Puffinus griseus)* and Leach's storm-petrels *(Oceanodroma leucorhoa)*. Also included are various high Arctic and tundra nesters which during their non-breeding season live at sea. Included in this group are northern phalaropes *(Lobipes lobatus)*, red phalaropes *(Phalaropus fulicarius)*, pomarine jaegers *(Stercorarius pomarinus)*, parasitic jaegers *(S. parasiticus)*, long tailed jaegers *(S. longicaudus)*, Sabine's gulls *(Xema sabini)*, and Arctic terns *(Sterna paradisaea)*. Although all these birds are best classified as migratory, our studies indicate that some red phalaropes and pomarine jaegers winter at sea off North Carolina.

Interesting, Unusual and Rare Species

Intensive field studies have done much to consolidate the fragmentary knowledge of the bird fauna and its local season of occurrence in the state. In fact over half the seabirds known from North Carolina waters have been discovered because of this effort. Many of the birds found were entirely unexpected in the area, even though the museum's studies have shown some to occur with considerable regularity. Included in this group are black-capped petrels *(Pterodroma hasitata)*, South Trinidad petrels *(P. arminjonina)*, little shearwaters *(Puffinus assimilus)*, white-faced storm-petrels *(Pelagodroma marina)*, band-rumped storm-petrels *(Oceanodroma castro)*, South Polar skuas *(Catharacta maccormicki)*, great skuas *(C. skua)*, blue-faced boobies *(Sula dactylatra)*, brown boobies *(S. leucogaster)*, and brown noddy terns *(Anous stolidus)*.

The State Museum's studies are still in progress, and many amateur bird watchers have taken up the pursuit of pelagic birds as well. North Carolina, because of its unique assemblage of seabirds, attracts interested observers from all over the country. Because of the combined scientific and amateur interest in the state's seabirds, knowledge about their period of occurrence, relative abundance and behavior will continue to increase. So, too, will the list of species that are known to live off our coast. ⊠

Transplanting Is Underway

Wild Boar Hunting Popular

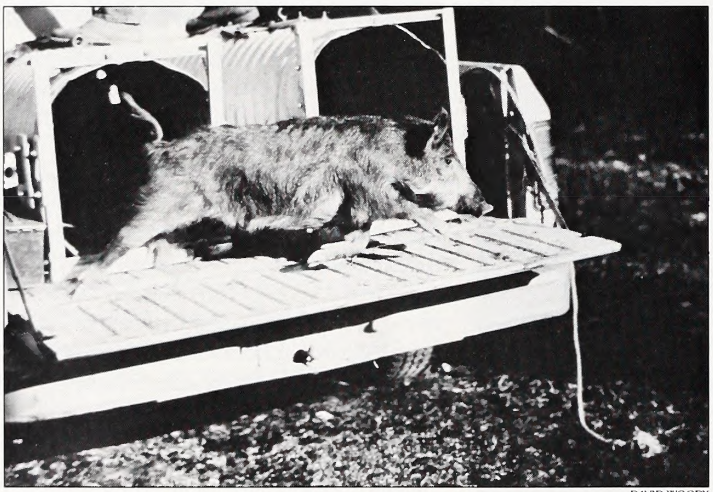
Written and Edited by Mark Taylor

Mention the wild boar to most people, and they conjure up visions of a hot-tempered animal sporting long tusks. Yet, the boar is also one of our most popular game animals, and each year hunters come from all over the nation to hunt them in our western mountains.

The best hunting is found on game lands near the Great Smoky Mountains National Park. Wild boar are considered an exotic species in the park, and a cooperative program is under way to remove the animals and release them on nearby game lands. This program is conducted by the National Park Service, U.S. Forest Service, N.C. Wildlife Resources Commission, and volunteer sportsmen from Graham County. More than 2,350 wild boar have been relocated from the park since the program began.

In 1987, over 260 wild boar were relocated from the park to game lands in Graham County. All of these boar were released in the watersheds of Big Santeetlah Creek and Big Snowbird Creek. With over 25,000 acres located within these watersheds, there's plenty of room. If you're planning to hunt these areas for wild boar, however, be prepared for rough, steep terrain and some of the most breath-taking views found anywhere.

— David Woody
Wildlife Management Technician
Andrews



DAVID WOODY

DAVID WOODY

Ticklish Business: *Wildlife management technicians Mike Carraway (left) and Dave Woody weigh a wild boar caught in the Great Smoky Mountains National Park. The animal was released on the Nantahala Game Lands.*

Field Notes

The following seasons are open this month:

- Deer:
  - ⋆ Eastern gun season open through Jan. 1.
  - ⋆ Central bow and arrow season open through Nov. 7.
  - ⋆ Central muzzleloading season runs from Nov. 9-14.
  - ⋆ Central gun season runs from Nov. 16-Jan. 1.
  - ⋆ Northwestern bow and arrow season open through Nov. 14.
  - ⋆ Northwestern muzzleloading season runs from Nov. 16-21.
  - ⋆ Northwestern gun season runs from Nov. 23-Dec. 5.
  - ⋆ Western bow and arrow season open through Nov. 21. (see regulations for Yancey County exception)
  - ⋆ Western gun season runs from Nov. 23-Dec. 12.
- Black bear (western) open through Nov. 21 and from Dec. 14-Jan. 1.
- Dove open from Nov. 23-28 and from Dec. 18-Jan. 9.
- Wild boar open through Nov. 21 and from Dec. 14-Jan. 1.
- Gray and red squirrels open through Jan. 30.
- Fox squirrels (in open counties) open through Dec. 31.
- Rabbit open from Nov. 21 through Feb. 29.
- Quail open from Nov. 21 through Feb. 29.
- Ruffed grouse open through Feb. 29.
- Pheasant (males only) open from Nov. 21-Feb. 1.
- Raccoon and opossum (western) open through Jan. 30.
- Raccoon and opossum (eastern) open through Feb. 29.
- Rails, moorhens and gallinules open through Nov. 14.
- Common snipe open from Nov. 13-Feb. 27.
- Woodcock open from Nov. 21-Jan. 4.
- Ducks open from Nov. 26-28 and from Dec. 14-Jan. 16.
- Sea ducks open through Jan. 16.
- Snow geese open from Nov. 2-Jan. 30.

Check *Regulations Digest* for information on season boundaries, bag limits, and other regulations. Copies of waterfowl regulations are available from license agents.

Sportsmen are reminded that all big game (deer, bear, wild boar) must be tagged and reported to a wildlife cooperator agent.

Quail Show Slight Decline

Ruffed Grouse Populations Up In Hunter Survey

Quail down, grouse up. Those were the results of last year's avid hunter survey which uses hunter success to help gauge trends in small game populations.

To obtain meaningful data, the survey is limited to sportsmen who hunt more than 15 times and harvest over 50 quail annually. Hunters are asked to return trip cards on which they record the number of hours hunted, flushes or covey rises per trip, and the number of birds harvested.

Last year, 146 quail hunters participated. Hunting parties took an average of 4.26 birds per trip, down slightly from the previous year. Covey rises were also down slightly.

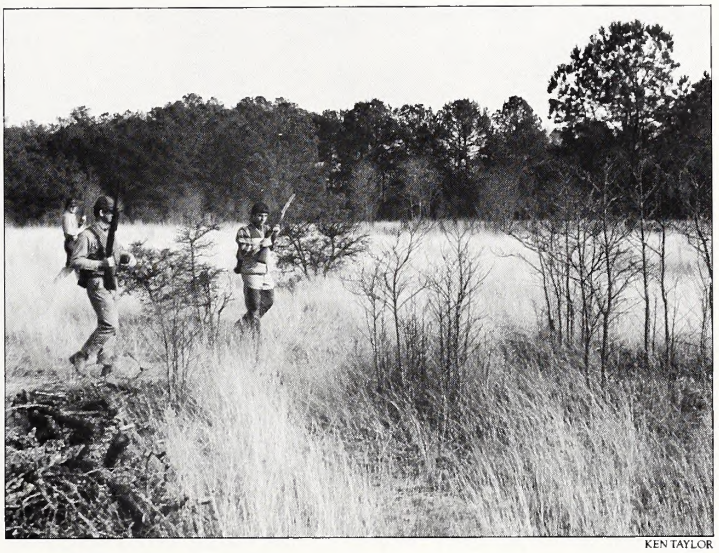
"The severe drought in the summer of 1986 probably hurt quail hunting last fall," said Terry Sharpe, small game project leader for the N.C. Wildlife Resources Commission. "The preceding season had also been quite good, which helps account for the drop."

Grouse hunters, however, saw more grouse last season than in preceding years. Hunting parties averaged .75 flushes per hour, up from .67 for the two years before. The average harvest per party, however, was down slightly.

What does the upcoming season hold? Sharpe thinks that hunters will see an upswing in quail hunting, and grouse hunting will be about the same.

"We had moderate temperatures and rainfall throughout the summer in most of the state," he said. "Even though it was dry, there wasn't a prolonged drought. This should have resulted in good nesting success and survival of young birds."

Sharpe also needs additional grouse hunters for the survey. Interested sportsmen who hunt grouse regularly should write Terry Sharpe, 317 Hamlet Ave., Hamlet, N.C. 28345.



KEN TAYLOR

Time Well Spent: *Quail hunters last year took an average of 4.26 birds per trip, down slightly from the previous season. Severe drought may have caused the drop. Grouse populations, however, are up.*

Popping Bug With Gnat Gets 'Em

Fishing a popping bug for bass and bream is a lot of fun. But, if fishing is slow, try adding a sinking black gnat that trails behind the popping bug. Tie a short (10-12 inch) leader to the eye of the popping bug, and tie the gnat onto the trailing end.

"I heard about this trick 25 years ago from my uncle, but never tried it until one night last summer when the fishing was really slow," said Lawrence Musselwhite of Wilmington, conservation education field representative for southeastern North Carolina. "Things changed pretty quick after that. We caught and released over 150 bream on this rig that evening."

Musselwhite says that the fish are apparently attracted to the popping bug, but then hit the sinking gnat. All but three of the 150 bream, for example, struck the gnat.

"I didn't have any trouble with the two flies tangling, and the only thing you do differently is fish the popping bug a little slower than normal," he said. "Also, keep a close eye on the popping bug. When a fish hits the black gnat it will pull the popping bug under water. It's a lot like fishing with a bobber. This should work real well on warm days right through late fall."

Transported From New York

Geese Call North Carolina Home

ANGELA HILL

New Turf: *Nearly 1,000 Canada geese from New York, Delaware, Pennsylvania and Virginia were brought to coastal North Carolina this summer. The birds were released on restoration sites in Hyde and Currituck counties, and their primary feathers were clipped to prevent them from flying until they adjust to their new surroundings. Biologists hope that these birds will help establish a resident population that will winter in the state.*

First MARSH Project In State

Mackay's Island Project Dedicated

ANGELA HILL

A Happy Day: *Eugene Price (left), chairman of the Wildlife Commission, and Hazard Campbell (center), president of Ducks Unlimited, present a $15,000 check to James Pulliam of the U.S. Fish and Wildlife Service to help pay for the new Mackay's Island MARSH project in Currituck Sound. This cooperative project will improve waterfowl habitat on the refuge.*

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Life Jacket Most Important Gear

Cold Water Threatens Boaters

What's the most important piece of equipment on board any boat? It's no contest. A good personal flotation device, commonly called a life jacket, is first on the list. While state law doesn't require that these be worn, there must be Coast Guard-approved PFDs for every person aboard a boat and they must be readily available at all times.

Questions have been raised recently inquiring whether wildlife enforcement officers must wear a PFD. Wildlife Commission policy does not require this. In hot weather, for example, many officers prefer not to wear them. Rest assured, however, that the legal number of PFDs are always on board any Wildlife Commission boat, and employees are quick to put them on when conditions warrant it.

"It's always a good idea to wear a PFD if you're boating alone or the weather is rough, and children and non-swimmers should wear PFDs at all times," said Major C.J. Smith, supervisor of field operations for the Wildlife Commission's Division of Enforcement. "This is especially true in fall and winter when cold water offers the threat of hypothermia or death by exposure if a capsizing occurs. Fishermen and duck hunters should also wear warm clothing that offers insulation when wet — such as wool or some of the new synthetic pile garments — in addition to a Coast Guard approved PFD or flotation jacket.

"Another good idea is to leave a float plan telling where you're going, when you left and expect to return, and who is on the trip," says Smith. "Although some of the best hunting and fishing occurs in late fall, be careful. Stick to sheltered waters, and if it begins to get rough, head for shore immediately."

Great For Sandwiches

How About A Whitetail Salad?

If you like chicken, ham or tuna salad and have access to some venison, you may want to try "deer salad." This idea came to us from Ed Efird, who operates a nursery and rifle range near Albemarle.

Ed butchers his own deer, but the waste caused by throwing away bones with good meat still attached always bothered him. So, he developed this technique of making deer salad, and liked the finished product so well that he decided to pass it along.

After butchering your deer set aside the neck, backbone, and any other bones containing meat. Put these in a large pressure cooker or canner, and steam the meat off the bone. After it cools, separate the cooked meat from the bones and run it through a meat grinder or a food processer with a chopping blade. Meat can then be mixed with other ingredients as you normally would to make a meat salad. The ground deer meat can also be frozen for later use, but be sure to freeze only meat and not the finished salad.

Ed says that deer-salad sandwiches are so popular around his house that he now processes nearly an entire deer for this purpose every year.

— *Terry Shankle*

Nongame Program Strengthened

Wildlife Bills Passed By General Assembly

A number of bills relating to wildlife were passed by the General Assembly last summer. These ratified bills are as follows:

—SB 116 permits the taking of one antlerless deer during the muzzleloading season in areas of eastern North Carolina where the bag limit is five deer per season.

—SB 280 increases fees for annual and lifetime hunting, fishing and trapping licenses. These increases will generate about $3 million in additional revenues annually to help fund on-going programs.

—SB 299 requires that anyone hunting waterfowl in North Carolina must possess a state waterfowl license in addition to a hunting license and a federal duck stamp beginning with the 1988-89 season. Anyone having a lifetime sportsman's license is exempt from the state waterfowl license provision, however. The North Carolina waterfowl stamp, which will sell for $5.00 from license agents, will serve as the state waterfowl license. This bill also increases the penalties for violations of waterfowl regulations.

"This legislation should add about $150,000 annually to our waterfowl management program," said Richard B. Hamilton, assistant director of the N.C. Wildlife Resources Commission. "These funds will be used for waterfowl habitat acquisition and improvement, and for waterfowl research. The provision increasing the state penalties for waterfowl cases will also help curtail violations. These will make penalties for violations tried in state courts comparable to those levied in federal cases."

—HB 150 requires anyone hunting bear, deer or wild boar with firearms (including muzzleloaders) to wear a fluorescent orange cap or vest.

—HB 599 adds penalties to regulations prohibiting the release of pen-raised wild turkeys into the wild. These releases often result in the introduction of domestic poultry diseases into wild populations of wild turkeys.

—HB 602 makes violations of federal steel shot regulations for waterfowl hunting state violations as well. Previously, these cases had to be tried in federal court.

—HB 664 provides for the conservation, management and protection of nongame and endangered wildlife in North Carolina. This Nongame and Endangered Wildlife bill establishes the Wildlife Commission as the agency responsible for the conservation, management and enhancement of nongame wildlife in North Carolina, and designates the Nongame Wildlife Advisory Committee as the group responsible for making recommendations on nongame wildlife protection and management to the Commission. The bill also authorizes the Commission to develop an official state list of animals which are endangered, threatened, or of special concern in North Carolina. Those species which are federally designated as such, and are found in the state, will automatically be listed.

"This bill is a landmark piece of legislation," said Hamilton. "It gives us full statutory authority to adopt and enforce regulations protecting nongame and endangered wildlife, and to develop comprehensive management and recovery plans for these species. We look forward to working with conservation groups and the public as this exciting program is developed."

—HB 345 authorizes wildlife enforcement officers to enforce littering laws statewide. Previously, their jurisdiction was limited to game lands and public waters.

Calendar Of Events

Nov. 5-7
Cape Hatteras Invitational Surf Fishing Tournament. For more information contact the Cape Hatteras Anglers Club, Buxton, N.C. 27920.

Nov. 7-8
16th annual Folk Festival at Louisburg College in Louisburg.

Nov. 14-15
Raleigh Gun and Knife Show at the N.C. State Fairgrounds in Raleigh.

Nov. 14-15
Roanoke Arts and Crafts Guild Fair at Williamston High School.

Nov. 22
Harvest Day at the Schiele Museum in Gastonia. Features a Thanksgiving celebration of 200 years ago.

The Wildlife Endowment Fund Report

The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife in North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Status on August 31, 1987

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	43,366	$12,413,454.88
Lifetime Hunting License	216	42,760.19
Lifetime Fishing License	3,212	544,208.83
Lifetime Subscriptions to Wildlife in N.C.	1,166	144,361.21
Contributions	—	91,770.03
Fund Total		$13,236,555.14
Total Interest Earned	$1,997,053.10	

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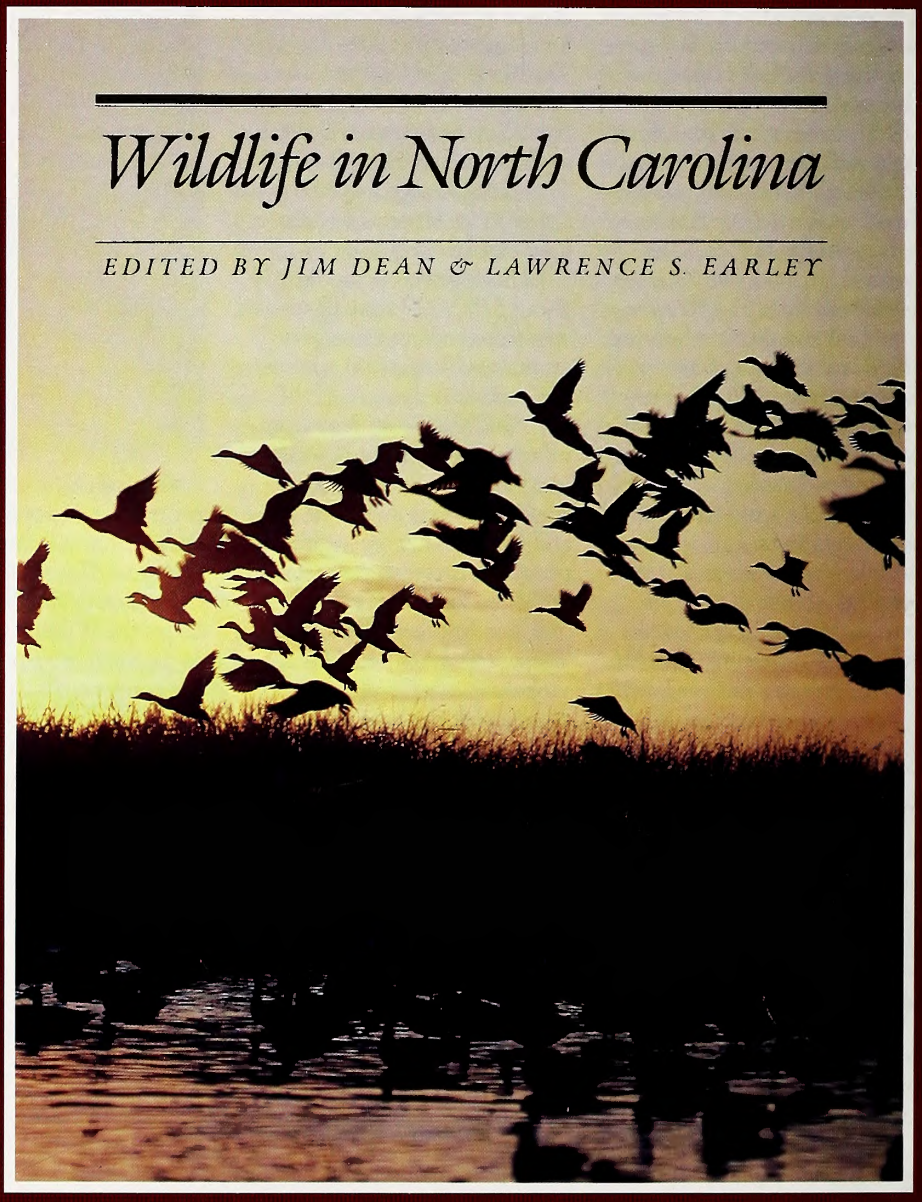

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Appalachian Royalty

Considered "King Of The Gamebirds," a ruffed grouse looks for a winter snack on a snow-blanketed ridge in the Southern Appalachians.

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WILDLIFE IN NORTH CAROLINA

DECEMBER, 1987 75 CENTS

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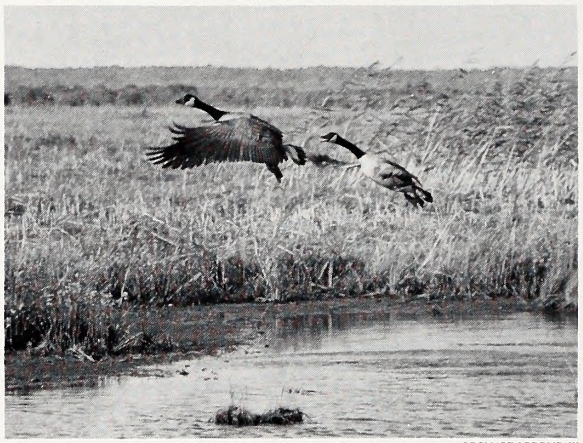
A Goose For Lemmie

by Jim Dean

Long before daybreak, we leave the warm lodge and crunch on frozen grass past a scraggly cedar strung with unlit lights. A short drive takes us to the frame building south of the causeway where other hunters have already gathered to draw for guides and blinds.

Standing apart, some of the guides joke among themselves, all seemingly dressed far too lightly for the cold — a couple of flannel shirts topped by an oilskin and hip boots turned down at the knee. Obese in wool, goose down and chest waders, the rest of us look like grizzlies emerging from a den. Our frosty breath mingles with cigarette smoke and the drifting exhausts of trucks and cars.



LEONARD LEE RUE, III

In the backs of some of the trucks or behind fogged windows, huge Labradors and Chesapeakes stand quietly, ignoring us with professional disdain. Their eyes say, don't even think about scratching behind our ears when there is work to be done. We have our orders; geese will be retrieved.

I am one of the hunters, feeling a bit awkward and out of place. It occurs to me that I would probably fit in better with the dogs than with either the hunters or guides. So I merely watch, storing moments like random clips of old movie film. It seems odd that you can seldom dictate what you want to remember, nor do the bits of film you manage to preserve have much meaning for anyone else. The unedited portions are too brief, too isolated.

Headlights from the guide's dusty, black Chevrolet carve a yellow slice along the dikes bordering Lake Mattamuskeet as he drives us to his blind. As we stack our shotguns and gear in the skiff for the short trip up the canal, the flashlight momentarily illuminates the heads of decoys coated with rime. Thin ice cracks and tinkles like a crystal chandelier as the guide, followed by his yellow Lab, sets out decoys in the shallow water around the blind. Out of the hollow night, the flutelike calls of waking Canadas begin as single notes and gather disharmony — an orchestra tuning. We shiver, but not from the cold.

The light comes so imperceptibly that you are first aware only that the stars can no longer be seen. Later, as the sun rises through the rim of distant trees and thin clouds, the sheet ice and glazed vegetation are instantly aflame. It is, I think, always the best of it, a moment so intense that you swear you will never sleep through another winter dawn. Even when you know such a clear morning is a likely omen of inferior hunting, you can hardly fault its beginning.

Our guide, Lemmie Cahoon, has little to say, but his reserve is natural, without the patronizing air often adopted for "sports." It is obvious he is here because he wants to be — would be here even if we weren't — and takes pride in his blind, his dog and his years of experience. More than that, he seems pleased to share this day with companions drawn by lot and common interest. Perhaps it is because he is older — he appears to be in his 70s — but he also seems to feel no compulsion to continually remind us we are merely clients or to prove his superior skill. It is a fairly rare attribute, one we instinctively appreciate. In return, we tell him we have no unrealistic expectations.

By mid-morning, it is apparent that it is going to be a slow day. Indeed, the only geese we have seen have been on the distant horizon, long wavering lines flying to the fields to feed. He scans the sky, occasionally leaving the blind to move decoys that have blown together or knock the ice off their bills.

As the end of legal shooting approaches, he tells us of other hunts, of his early years as a waterfowler. Yet, still he watches, and several times expertly calls in ducks, most of which we miss. "No matter," he consoles. "You'll get 'em next time."

The geese slip in quietly, coming in low over the trees behind us — an improbable dozen returning early from the fields, uncharacteristically quiet. But Lemmie has seen them, almost too late, and his warning freezes us in awkward positions, a hand reaching for peanuts, a cup of coffee at chin level, a laugh riveted. Lemmie is in a crouch, and we watch his eyes to mark the approach.

"Behind us," he says. "Get 'em boys."

Wings set, they are strung out above the marsh like a Christmas card. We each drop one, and the yellow Lab is instantly among them. Lemmie shares our excitement so convincingly that it could have been his first goose, too.

The year was 1959. Lemmie and my grandfather are long dead, but a father and brother still share this memory, the kindness and the camaraderie of the best guide we ever hunted with.

This is for you, Lemmie.

December, 1987
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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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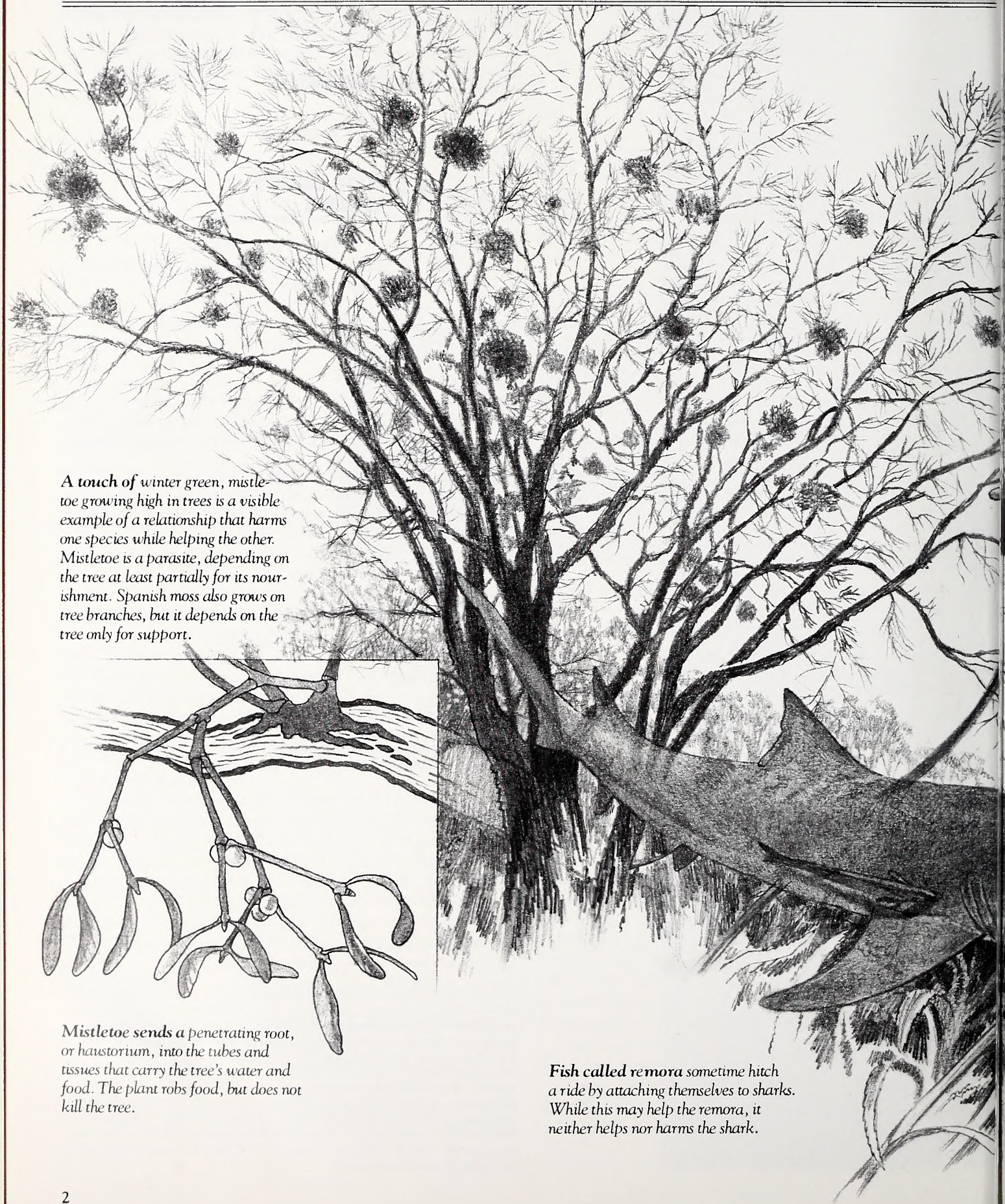


A touch of *winter green, mistletoe growing high in trees is a visible example of a relationship that harms one species while helping the other. Mistletoe is a parasite, depending on the tree at least partially for its nourishment. Spanish moss also grows on tree branches, but it depends on the tree only for support.*

Mistletoe sends a *penetrating root, or haustorium, into the tubes and tissues that carry the tree's water and food. The plant robs food, but does not kill the tree.*

Fish called remora *sometime hitch a ride by attaching themselves to sharks. While this may help the remora, it neither helps nor harms the shark.*

Natural Buddies

written by Lawrence S. Earley / illustrated by David Williams

***Many plants and** animals live together or depend upon each other in relationships that may be beneficial, harmful or neutral. Bees that pollinate flowers are examples of a beneficial relationship. Both plant and animal benefit from the arrangement.*

The woods are bare now, except for the laggard oak and beech leaves that always seem to hang on well into the new year. Yet, in the high branches of certain trees, little bushy growths of green are becoming noticeable. It's mistletoe, just in time for the holidays.

Tacked inconspicuously above doorways, mistletoe plays an important role in bringing people together at this time of year. But mistletoe itself is a good example of a plant that exists only because of its close relationship with another plant. That's because mistletoe is a parasite, requiring a host tree for its nourishment and continued existence. There are hundreds of other plants and animals that live together, some in parasitic ways, some in ways that are beneficial. All of these relationships are forms of *symbiosis*.

One symbiotic relationship, called mutualism, occurs when two species live together in a way that benefits both. The classic examples are the lichens, which are formed of two plants, an alga and a fungus. The fungus provides the physical framework for the lichen; the alga, which contains chlorophyll, makes the food. Neither could exist without the other. The relationship between pollinating insects and flowering plants is also beneficial. The bee gets the honey, and the flower gets pollinated.

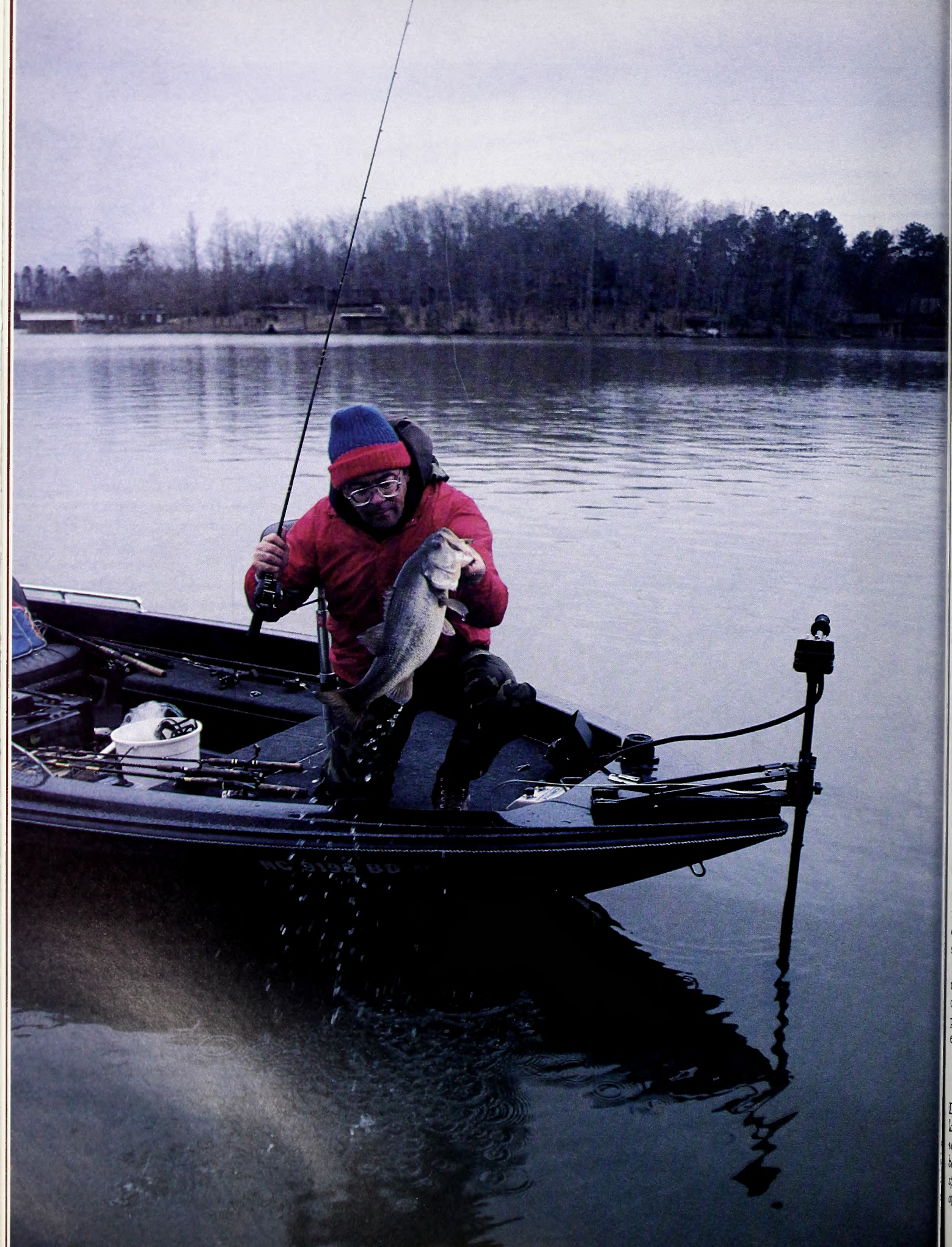
Some plants or animals live together in a way that neither helps nor harms the other. Some orchids that grow in trees, for example, rely on the host only for support, since they are able to draw nourishment out of the humid air with their roots. Draped picturesquely over branches of trees, Spanish moss is another plant that grows independently of its host. These are examples of *commensalism*.

Commensalism exists in the animal world, too. Cottontails sometimes use the burrows of woodchucks; mink take the dens of muskrats. Barnacles sometimes grow on the shells of horseshoe crabs; remoras attach themselves to sharks for a free ride, and get to eat what the shark doesn't.

And then there are parasites — plants or animals that live on or in another species but at their expense. Here's where the mistletoe comes in. Like Spanish moss, mistletoe uses its host tree for support, but unlike Spanish moss, it sinks rootlike structures within the tree and taps it for nourishment. Mistletoe is an unusual parasite because, with its green leaves, it also can make its own food. Some parasites actually kill the host, notably the larvae of some insects that live within another insect, eating its soft tissues. Certain parasites can decimate a deer herd if the deer population is too high. But mistletoe, though it draws sustenance from the host tree, will not kill it.

Social parasitism occurs when an animal depends on another to perform needed tasks. A good example is the cowbird which refuses to build a nest, brood its young or feed them. Instead it lays its eggs in another bird's nest, and turns over the rearing chores to the other bird. Bald eagles engage in social parasitism when they pester ospreys into dropping their food.

Plants and animals live together in many different ways, sometimes benefiting from the arrangement, sometimes not. Because of these relationships, few plants or animals can truly be said to live alone.



A Stocking Full Of Bass

Don't put your bass fishing tackle away too early this winter because ol' Santa Claus has a surprise for you.

written and photographed by Pete Elkins

As each December arrives, I give silent thanks for the National Football League, television, and generally miserable weather. This heartfelt appreciation is particularly sincere because some of our year's best, and least crowded, bass fishing occurs this month.

December bass receive little fishing pressure since most bass anglers are either deer or small-game hunting. Less serious outdoorsmen are more likely to be stretched out in front of a TV, soaking up food and vicarious pigskin pleasures. Let's join in a toast to the continued good health of professional football (player strikes notwithstanding).

In addition to the fact that the state's large lakes are not overflowing with boats, December's colder water creates very predictable bass behavior. One caveat should be immediately noted. Most of my observations on winter bass fishing apply to larger ponds and reservoirs, specifically to those with water deeper than 20 feet, and those containing shad as forage.

Smaller ponds, true "farm ponds," and rivers and creeks are a very different proposition in the winter months. For the most part, good fishing in these smaller waters is extremely dependent upon good weather. Given a few warm sunny days, farm pond bass revert to habits and locations not unlike those in warmer months. With the inevitable return of seasonably cold weather, farm pond bass are difficult to catch except with live bait. But large water bass are another subject altogether.

Larger Tar Heel waters that feature all the requisites for excellent December bass action include virtually every lake over 100 acres in the state. Of course, the most obvious, and the best, are lakes along the major river systems such as the Catawba, Yadkin/Pee Dee, and Roanoke.

There's little reason to single out particular ones because they can all be productive if certain fundamental fishing rules are followed. The primary rule is to think deep!

Once water temperature drops below 50 degrees Fahrenheit, largemouth bass tend to school tightly in fairly deep water. Bass anglers who fancy themselves as skilled "structure fishermen" can verify the level of their skill, or lack thereof, in December.

Deep winter bass are not scattered randomly throughout a body of water, but that's actually a fortunate thing since once you've found one or two, there will usually be others nearby. The fish are almost always near some bottom feature such as a channel ledge, submerged hump, creek bend, brush, stump, or submerged treetop.

At this point, inexperienced bass anglers may be asking "so what else is new?" The key to making these traditional "structure" areas pay off in December is finding such structure when it also harbors large shad concentrations.

An example of what this can mean took place last December at one of the productive Yadkin River lakes, chosen solely because of its proximity to my home. I've had the same thing happen under similar conditions at many lakes possessing shad and deep, clear water.

My fishing partner and I had located a consistent pattern of bass at a depth of about 26 feet on long shoulder points forming the mouths of small coves adjacent to the main lake river channel. Unless shad were suspended over the bottom about 15 feet below the surface, we caught no bass. If the shad were there, however, we caught bass with pleasant ease. Largemouths in the 1- to 3-pound class were suspended several feet below the schools of shad, and once located, catching the bass was only a matter of choosing a method and lure that was most effective under the conditions.

I think it's impossible to overemphasize the importance of these shad concentrations in locating and catching December's frigid bass. Indeed, shad are so important that they should be viewed as a sort of movable structure for winter bass.

Since you've got to find bass before you can catch them, you'll need certain items to reduce the complexities of the task. A good depthfinder is a must, along with the ability to interpret what it reveals. Flasher units are adequate in experienced hands, but there's no escaping the fact that the more expensive chart recorders make the whole process of locating structure, shad and even bass themselves much simpler.

In the example already cited, it would have been impossible to distinguish a productive point from a nonproductive one — one without shad, that is — without a depthfinder. With my chart recorder, however, it was easy to see exactly where the bass were in relation to the shad. On that particular day, the bass were suspended about 3 feet below the shad school, and wanted the lure right in front of their noses.

As water temperature continues to drop through and beyond December into the low 40s, the ability to place a lure within inches

***Dave McQuigg lands** a Piedmont lake largemouth that couldn't resist a vertically jigged spoon. Largemouth bass in cold water tend to gather in specific spots, and the average size of those you catch may be larger.*

The best deep-jigging *in winter usually occurs in relatively clear, deep water on calm days, and even a light drizzle doesn't seem to put a damper on the action.*

of the known location of a bass becomes even more critical. Most anglers prefer to mount a chart recorder on the boat steering console. Once fish or potential fish are located with the chart, the angler moves up front to maintain precise boat position with a bow-mounted electric motor. Consequently, it's nice to have the depthfinder transducer mounted on the electric motor.

Electric motors make it possible to capitalize on another winter fishing fundamental just as valid as "think deep." You should also "think vertically."

Vertical fishing tactics are both easy and highly effective when combined with good use of electronics and precise boat control. Vertical fishing tactics are far from new. An ice age man jigging a carved chunk of walrus tusk below a hole chipped through the surface of a frozen lake would immediately recognize the technique used by a modern bass angler jigging a stainless steel Hopkins spoon with a graphite rod.

The popularity of spoon jigging varies considerably from lake to lake. It's a common practice on many Carolina lakes in the winter, and I've caught lots of good bass with the method while watching other anglers fruitlessly pounding the water with a host of other lures and methods.

Simply stated, if you want to enjoy the best dreary, drizzly, and delightful bass fishing of all, learn the nuances of spoon jigging. A lot of Carolina anglers get that crazed look when talk shifts to topwater lures and shallow, spring shorelines. Others wax lyrical about bogus worms and summer dropoffs. But give me a relatively windless, winter day, a stable boat, electric motor, depthfinder, a couple of marker buoys, and a handful of Hopkins spoons, and I've found a little slice of angling Nirvana.

Of course, there's a bit more to spoon jigging than merely jerking a submerged spoon up and down below the surface. Your choice of spoons is a fairly simple part of it, however, because there aren't too many available. I think the Hopkins spoons are at the top of the heap, especially the ¾-ounce Shorty 75 and the newer ½-ounce model. Blue Fox's Tor-P-Do, ½-ounce spoon should also be in a spoon jigger's inventory because it's a "flutter" type spoon that falls more slowly than the Hopkins. At times, this slow flutter works wonders, but in water much deeper than 25 feet, the slow fall is tough on one's patience. There are a few other reliable jigging spoons, but these will pretty well cover the winter waterfront.

Since a spoon derives its effectiveness from its mimicry of a troubled shad, silver or chrome finish is best. Don't be reluctant to try a gold finish, especially if the water is a bit murky.

When jigging over a large concentration of bass, it's not unusual to have them "turn off" or quit hitting after a half dozen or so have been hooked. A change of spoon color or style will sometimes renew their interest, however, another argument for carrying more than a single style, size or color of spoon.

Experienced spoon jiggers replace the heavy factory treble hook on a Hopkins 75 with a bronze No. 1 or No. 2 thinner wire treble. Adding a small split ring, preferably stainless steel, to the spoon's eye — where you tie on your line — will also enhance spoon action, and this helps prevent the line from fraying. I like fairly long rods — 6 to 7 footers — for spoon jigging. Graphite is superior, given the tactile nature of spoon jigging, because it is stiffer and you can "feel" what's happening at the lure end of the line. For comfort, one of the newer lightweight, narrow frame freespool casting reels is nice. A fast retrieve ratio is another advantage because it's necessary to frequently reel the spoon up and redrop it in order to fish the lure directly under the rod tip. This not only helps keep the lure at the right depth, but lets you impart proper action and feel strikes better.

Line size should be geared to conditions. In most larger Carolina lakes, spoon jiggers will inevitably encounter striped bass, and that may influence your choice of line test. I usually compromise with 12- to 14-pound monofilament for "feel," strength, and spoon descent rate. Mono much heavier than that doesn't really serve as well, and putting excessive pressure on a spoon-hooked bass is an invitation to lose the fish. A little jigging experience will reveal why. Many fish are lightly hooked, sometimes even on the outside of the mouth. Finesse will land such lightly hooked fish; muscle will not. If striped bass are the issue, a line that's too heavy may encourage you to play the fish too strongly and rip the trebles free or bend hooks.

Other necessary jigging gear includes some buoy markers and warm clothing. Buoys are essential to mark bottom features in open water, but when jigging for bass suspended below shad schools, a marker buoy can spook the fish if carelessly dropped too close to the action.

Assuming that all else is properly selected, lure presentation becomes the all-important element in success. As a general rule, the colder the water, the less movement you need to impart to a jigging spoon. An example again comes to mind from last year's experiences. I fished one large Carolina reservoir every other day or so for two weeks in late December and early January.

On our first foray, we located good concentrations of bass at the 22-foot contour line of a large, submerged island that topped out at about 12 feet and dropped off into 45 feet. The bass were tight along small scat-

***A selection of** jigging spoons artfully presented at the right depth under schools of shad can yield a variety of fish, including (top to bottom), white perch, white bass, largemouth bass and striped bass.*

tered patches of bottom brush.

I would mark two or three spots with buoys, circle back and begin jigging the first marker, then move on to the next one when action faded at each spot. The bass wanted the spoon jigged sharply up off the bottom for a foot or so, and they would strike as the spoon fluttered back down. The water temperature was 49, and the strikes were easy to detect.

On subsequent trips, the water temperature fell toward the 41-degree mark, and as it dropped throughout the two-week period from 49 to 41, the bass moved gradually deeper. On our last trip, we found them tight to similar brushy cover on the same island at the 30- to 32-foot contour.

As the temperature and bass location lowered, strikes became much more subtle, signaled often by only the slightest tick or instant's hesitation in line movement. An active spoon manipulation soon proved futile. Indeed, in the coldest weather and water, most strikes came as the lure was held absolutely motionless a few inches off the bottom.

Significantly, even though bass reaction to a jigged spoon slowed, the number of strikes did not. We enjoyed several days when we hooked in excess of 20 bass under these frigid conditions, and striper interest in jigged spoons actually increased as water temperature neared 40.

There are some tricks to increase strike detection. The first is to be a fanatic line watcher. Even when actively feeding, the strike of a bass on a spoon is most often signaled by line movement rather than a tactile "tick" or "bump." It helps to drop the spoon to the bottom, then, while the spoon is on the bottom, lower the rod tip so that it almost touches the water surface. With the tip almost touching the water, reel in slack until the spoon is barely touching the bottom. Then, begin an up and down jigging movement with the rod, making sure to follow the falling spoon back to the bottom with the rod tip. If the line goes slack before the rod tip nears the surface, strike!

I also like to palm the reel with my left hand so that the line just in front of the reel runs between my thumb and index finger. The increased sensitivity can make a difference.

Always hold the rod tip directly above the spoon while jigging. Doing so not only increases strike detection, but also makes it easy to jiggle a snagged spoon free. Wind can make it hard to maintain this vertical position over the lure, but you can compensate by jigging until the line angle changes from the preferred 90, then reel in and drop again. If wind is really moving the boat, it's best to flip the spoon slightly ahead of the direction of drift, as a trout fisherman "mends" his line to compensate for current speed.

Other lures can be vertically jigged much like spoons. Heddon's "Sonar" is an effective jigging lure, and I've also seen winter stripers and largemouth very enthusiastic about vertically jigged Cordell "Spots." Lures like the "Little Georges," "Gay Blades," and bucktail jigs also have their moments.

For most winter fishing, however, spoons remain my favorite, especially in lakes where bass, stripers, white bass, and white perch are all bonkers for spoons.

One other lure that I include in my spooning tackle box is one not seen in too many Tar Heel lakes: Rapala's ice jigging lure. This fragile looking, elongated lure comes in several sizes, and has been absolutely deadly on several winter days during the past few years. It's at its best in really clear water.

Unlike spoons, I like to jig the ice-fishing Rapala with light spinning gear. This has resulted in a few wild moments when hefty striped bass crashed what had been a *micropterus*-only party.

That, of course, only makes it all the more interesting for skilled spoon jiggers who find December lakes uncrowded and uncommonly productive. Sure, it can be dreary, drizzly, cold, and generally miserable, but the fishing can make it the most delightful month of the year. ⊠

LAWRENCE S. EARLEY

Twilight For JUNIPERS

One of North Carolina's premiere trees, the Atlantic white cedar, faces an uncertain future.

by Lawrence S. Earley

SCR—EE—EE—EE—UU—UU—OOO—OOO—OOOMMM!

Here's a moment deep in symbolism. Above us, a streaking Navy A-6 fighter, a multi-million dollar piece of high-tech wizardry. In front of us, a truck loaded with freshly milled juniper planks, wobbling dangerously down a pitted logging road near the Dare County Bombing Range. The jet, a lethal machine of the late 20th century. The juniper, for three centuries the boatbuilder's choice of wood in the Southeast, but today lurching toward an uncertain future.

The truck can make a noise, too, and it does, groaning like a wounded buffalo as its left wheel dips into a canyon-sized pothole. A high whine replaces the fading sounds of the jet.

"Don't spin those retreads!" shouts Bill Beety to the truck driver. "I'll get you out of there!"

Beety — peckerwood saw mill operator, boatbuilder, seasonal fisherman and sometime surfer — hoists himself into the seat of his big-wheeled forklift, maneuvers the squat machine behind the mired truck, and lifts. The truck climbs out and groans piteously as it lurches into another hole. The juniper load sways like a drunken sailor. Beety shouts again, maneuvers, lifts. This machine ballet is repeated several more times, and finally the truck reaches hard ground and roars off in a grind of gears. Another load of juniper off to market, this one bound for a Wilson cabinet maker.

"Man!" says Beety, walking to his pickup. "I figured we'd be picking up juniper planks for the rest of the afternoon." He is amazed the load hadn't spilled. Beety had pocketed a nifty sum from the sale of his juniper, but now he is glad it's over. "He came that close!"

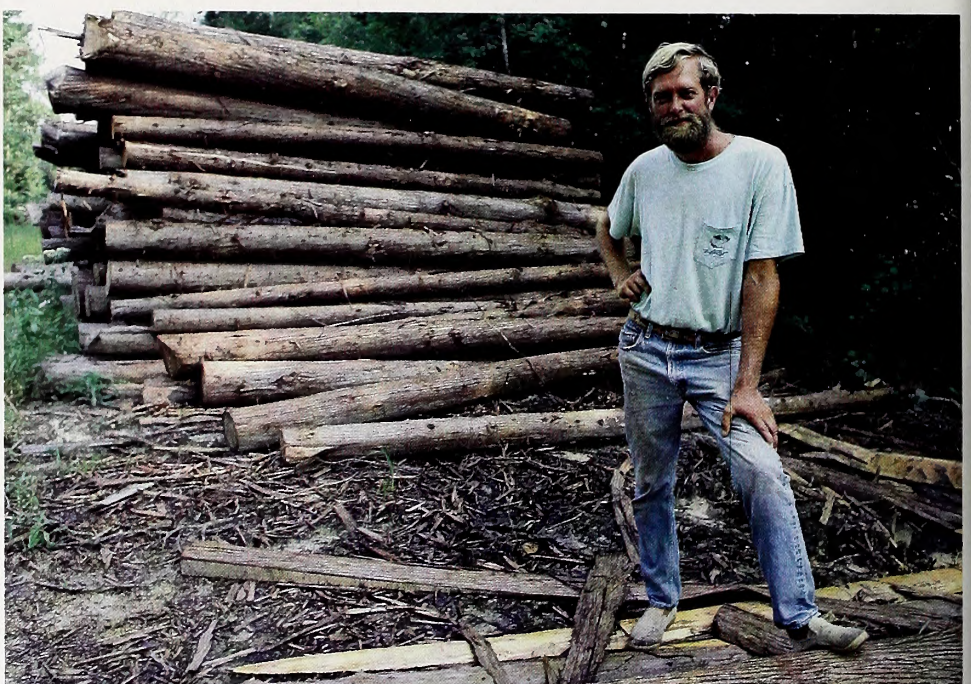
On our return to Manteo, Beety is quiet and reflective, perhaps exhausted by the ordeal of getting his planks out of the woods. But we talk, mostly about juniper and its predicament. Like buffalo on their western range, juniper — or Atlantic white cedar — was once thought to be inexhaustible, so vast were the stands in the eastern swamps and bottomlands of the state. But today juniper is rare, and getting rarer. And men like Bill Beety, who are accustomed to making their living from juniper, can only shake their heads at its future — and theirs.

The 39-year-old Beety is a different breed of man. In an era of specialists, he does a little bit of everything. With his sun-dyed blonde hair and crows-footed blue eyes, he has the classic good looks of a surfer, which he was when he attended the University of California at Santa Barbara. After college, he returned to his North Carolina home and took a job at a sawmill. Soon he owned his own sawmill and was filling custom orders from boatbuilders all over.

Typically, Beety puts his diesel sawmill into the woods that he's cutting, milling his lumber on-site. Everything he does is seasonal. In dead winter, he cuts wood. "Hope-

***A solid stand** of Atlantic white cedar rises out of the peaty soil of the Dare County mainland. A wetland species, white cedar — also called juniper — is disappearing from North Carolina because of wetland drainage and other habitat changes.*

Twilight For JUNIPERS



LAWRENCE S. EARLEY

Sawmill operator Bill Beety *custom cuts juniper mostly for small boatbuilders. Because of its light weight and resistance to rot, juniper is one of the most valuable trees in the East.*

fully I have it all sold and marketed by spring," he says, "and that's when the beach fishing starts." After the spring trout run ends, he lays low during the hot summer months and takes up fishing again in the fall, and after that he guides duck hunters on Pamlico Sound.

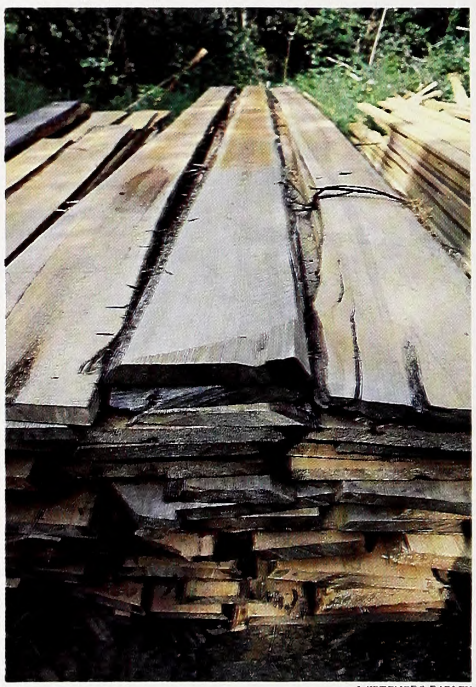
He's mainly known for his sawmill operations, however. He doesn't cut just any wood. As he says, "My house is juniper, my decoys are juniper, my boats are juniper and my business is juniper." Several seasons ago, he cut the juniper planking and decking for the *Elizabeth II*, the replica of the 16th-century Elizabethan ship that's moored on Roanoke Island most of the time. And he fills custom orders from boatbuilders up and down the East Coast. If you build boats with juniper, you probably have Bill Beety's telephone number.

Builders of small and medium-sized boats traditionally make use of juniper "flitches," the longitudinal sections of the tree with the bark still present on both sides. But only older trees can provide the wide, knot-clear "butt cuts" of juniper for planking their boats. How old do the trees need to be before they produce a 12- to 18-inch flitch? Possibly 100 years or so.

Unfortunately for boatbuilders and for Bill Beety, however, his days cutting old-growth juniper are drawing to a close. He owns the timber rights to about 600,000 board feet of juniper near the Bombing Range. "It's some of the prettiest juniper I've ever cut. But that's the last tract that I have rights to. And there's not a whole lot more of the kind of juniper I'm after. The juniper is just running out." According to one estimate, white cedar acreage in the Carolinas has declined 90 percent from the original range.

Why? What has happened to a tree that once grew so abundantly in North Carolina, and elsewhere, for so long?

To find out, it's necessary to know something about juniper itself. Actually, the word "juniper" is a misnomer, although few people south of the Mason-Dixon line know it by any other name. Early settlers confused the tree with red cedar *(Juniperus virginiana)* and the confusion has persisted so that only botanists and foresters call it by its scientific name, Atlantic white cedar *(Chamaecyparis thyoides)*. The historic range of the tree extended along the Atlantic coast southward from southern Maine to central Florida, and



LAWRENCE S. EARLEY

Juniper "flitches" *— boards with the bark still on them — are desired by East Coast boatbuilders.*

then westward along the Gulf coast to southeastern Mississippi. Most of the really large stands of juniper grew in the Pine Barrens section of New Jersey, and in two locations in North Carolina — the Dismal Swamp and the Albemarle-Pamlico peninsula.

Juniper is a wetland species, growing best in swamps, along river bottoms, in Carolina bays and in other wetlands. Like many wetlands, juniper swamps perform services valuable to humans, purifying water, absorbing excess water and storing it in subterranean reservoirs. The tree is a conifer, best viewed in winter when its tall, graceful and symmetrical lines are visible above the rest of the deciduous forest. A young cedar wouldn't be out of place in your Christmas living room, but for its nasty tendency to dry out quickly and drop its needles.

Juniper is one tree that seems to grow naturally in dense, even-aged, pure stands. It will also grow in mixed stands of maple, cypress and black gum, but if you enter a typical juniper forest, you're in what appears to be the land of the dead. The 100-foot-high canopy of close-growing cedars intercepts light so completely that you're plunged into darkness. You're surrounded by what appears to be a forest of telephone poles, some of them dead and leaning against the living. The mucky ground is littered with fallen trees and branches, and little else grows.

One reason why juniper trees grow in virtually even-aged stands is that the forest is particularly susceptible to fire and windthrow. But fire may well have been a necessary condition for new trees. Cedars cannot grow in shade; they will germinate and rise a little off the ground before ceasing growth. Thus a fire that destroyed the living forest also cleared an open surface where new seed-

LAWRENCE S. EARLEY

Juniper makes light, *tough boats that are in top demand. The wood is also used for furniture, house siding and house paneling. Whole trees were once used for telephone poles.*

lings would sprout.

Cedar thickets offer little food for wildlife, but biologists have found that many species use juniper swamps for the cover they offer. Among mammals, bears, deer, and rabbits find juniper stands handy as a refuge. Studies in the Great Dismal Swamp Wildlife Refuge show that cedars support more bird life than other conifer forests. Breeding birds, such as the black-throated green warbler and worm-eating warblers, especially appreciate its protective value.

All this wouldn't have meant much to most people, except that Atlantic white cedar is one of the most valuable trees on the East Coast. The wood "splits easily, finishes smooth, shrinks little, works easily with tools and is very resistant to decay," says a U.S. Department of Agriculture brochure. It forgot to mention its light weight and an aromatic bouquet that freshens a room.

Early settlers almost immediately recognized cedar's superior characteristics, despite the deep swamp habitats that made it difficult to log, and they set about using the wood in a variety of ways. Juniper wood made boats, of course, but also poles, tubs, pails and churns. Out of a juniper stand came boxes, crates and fencing; cabins, roofing shakes and shingles. In later years cedar trees made telegraph and telephone poles. Heavy logging of white cedar didn't begin until the late 19th century, when steam-dredging equipment allowed timber companies to drain some of the more inaccessible juniper swamps. That's when loggers threw railroad ties over the mucky peat soils and locomotives hauled the first big loads to rivers.

In 1975, a new era in juniper logging began when Atlantic Forest Products moved to Edenton, North Carolina, and quickly established itself as the largest juniper sawmill on the East Coast. The company negotiated the timber rights to 10,000 acres of land along the Alligator River and bought more land as well. About 13 million board feet (1 foot by 1 foot by 1 inch) of juniper have passed through AFP's doors every year since then, sold from Boston to Florida.

Until recently the company handled all phases of the logging operation — logging, trucking and milling. Today, the logging arm

Twilight For JUNIPERS

— Alligator Timber Company — has split off from its parent. The products AFP mills are designed for the housing market — fence rails, interior paneling and exterior siding. "We use the entire tree," says Richard Dixon, the company's plant manager. "The top of the tree we make into post and rails, the lumber we run into siding and paneling, and we even sell the bark for cedar mulch."

"Before we came to this area," says Dixon, "there had been a lot of small mills cutting white cedar mainly for boat construction. There hadn't been any volume produced for housing or any large jobs until we got into it. We proved we could supply a steady supply of siding and paneling for houses."

Just how steady that supply will be is in question today. The company's timber holdings lie mostly in Dare and Tyrrell counties — in what is now the Alligator River National Wildlife Refuge. When the 118,000-acre refuge was created in 1984 (recent acquisitions have enlarged the refuge to 129,093 acres), AFP owned the logging rights to 6,900 acres of white cedar in Dare County, and another 1,000 acres in Tyrrell County. "But virtually everything they own in Tyrrell County has been harvested," says John Taylor, refuge manager. "And by the end of this year, 90 to 95 percent of AFP's Dare County holdings will be harvested."

There are some in the area who point to AFP as the single reason for the juniper's growing scarcity in North Carolina. Their ability to buy timber rights on vast land holdings, and their methods of cutting the cedar have drawn complaints from some in the area. Vernon Gibbs of Columbia, an independent buyer, faults the company's clearcutting policies, whereby trees of all diameters are felled. "They're cutting our throats," says Gibbs. "They're not giving the young trees an opportunity to grow."

Ricky Scarborough, owner of Scarborough Boatbuilders in Wanchese, agrees. "I think AFP has done more damage in this area than anything that has ever been down here," he says. "I think there might have been juniper for the next 40 or 50 years if it hadn't been for them." Scarborough's custom-built sport fishing boats require the kind of specialized planking that only Bill Beety can provide any longer. "I use maybe 10,000 board foot a year, but that's not enough for AFP to even want to talk with me," he laments.

For others, clearcutting by AFP and even

Juniper Logging In The Old Days

In the days before the invention of the steam engine, logging was a rough trade high in manpower and low in technology. If you had an axe and a saw and plenty of muscle, you were in business. That combination was sufficient for many trees, but for a valuable swamp species like Atlantic white cedar and bald cypress it wasn't enough. Even if you could get into the deep swamp interiors to cut the trees, there was too often no way to transport them to streams and rivers and get them to market.

The invention of the steam engine changed all that. It precipitated many applications that eventually made their way to North Carolina in the 19th century, including the steam dredge and the steam locomotive. Botanist Cecil Frost estimates that with steam technology, loggers cut nearly 50 percent of North Carolina's juniper forests between 1870 and 1890.

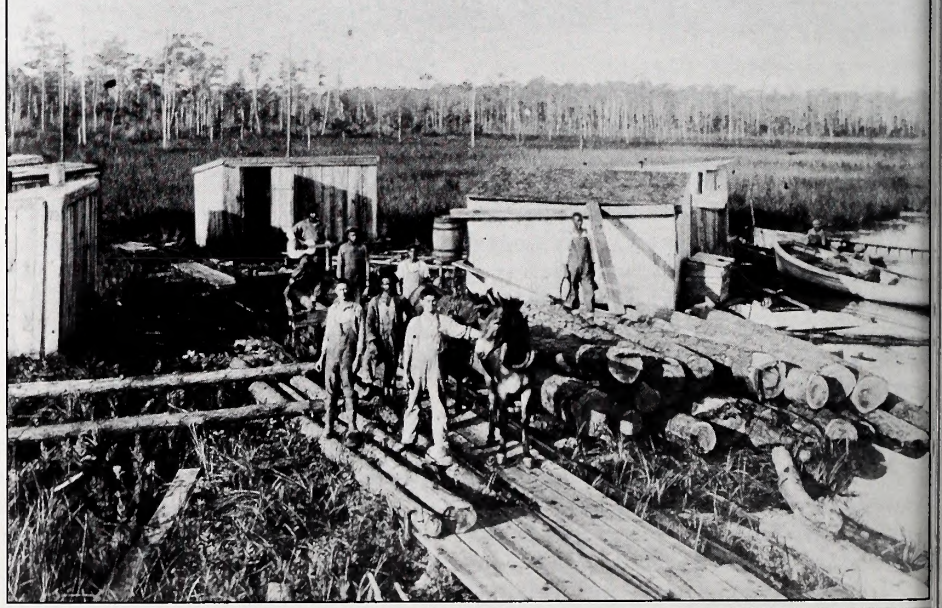
Probably the most legendary of all the logging towns in eastern North Carolina was Buffalo City, named after the Buffalo, New York, home of two men who in 1885 acquired 168,000 acres of land in Dare County, including some of the most extensive stands of juniper in the state. By 1914, the town boasted streets, a two-story hotel, a store, church, post office, and houses for loggers. There was even a one-room schoolhouse that charged a nickle a day per child.

Five hundred loggers worked six days a week for 15 cents an hour at Buffalo City. Steam skidders hauled cut logs to the narrow-gauge railroads which transported them to Milltail Creek. From there they were towed by tugboats to the Alligator River and eventually to Elizabeth City. Buffalo City attracted men from all over the country, and reportedly even an immigrant contingent from Russia. Like many logging towns, it drew a rough crowd that was free with fists and sometimes with knives and guns. Several killings occurred during its hey-day.

The Dare Lumber Company went out of business finally, and eventually West Virginia Pulp and Paper Company bought the land. First Colony Farms bought it from WestVaCo in 1974, and in 1984 the land became part of the Alligator River National Wildlife Refuge. Today nothing exists of Buffalo City and its era of steam logging except the rotting timbers of a few buildings and the memories of old timers.

***Eastern North Carolina's** wetlands defeated logging efforts for nearly 200 years, until the advent of steam technology. Railroad logging was not as harmful to juniper habitat as today's trucking which requires miles of road construction.*

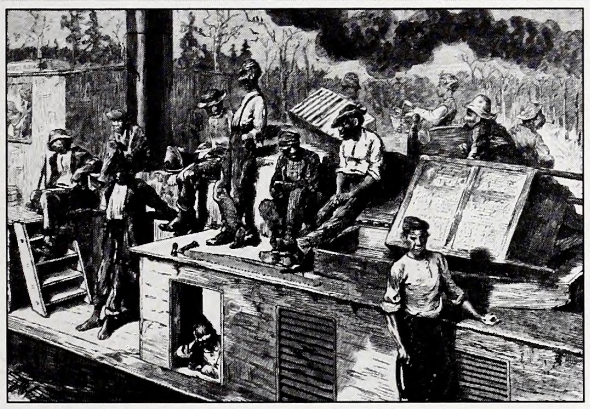
MUSEUM OF THE ALBEMARLE



NORTH CAROLINA COLLECTION, UNC LIBRARY AT CHAPEL HILL

***On a Sunday** off, loggers pose on one of the four locomotives used 80 years ago by the Dare Lumber Company at Buffalo City. Narrow-gauge rails penetrated the vast wetland wilderness of the Dare mainland, enabling the virgin juniper stands to be cut.*

***John L. Roper** Lumber Company was one of the world's largest timber operations — located in eastern North Carolina at the turn of the century. This photograph shows one of the company's steam skidders in operation in a juniper swamp.*



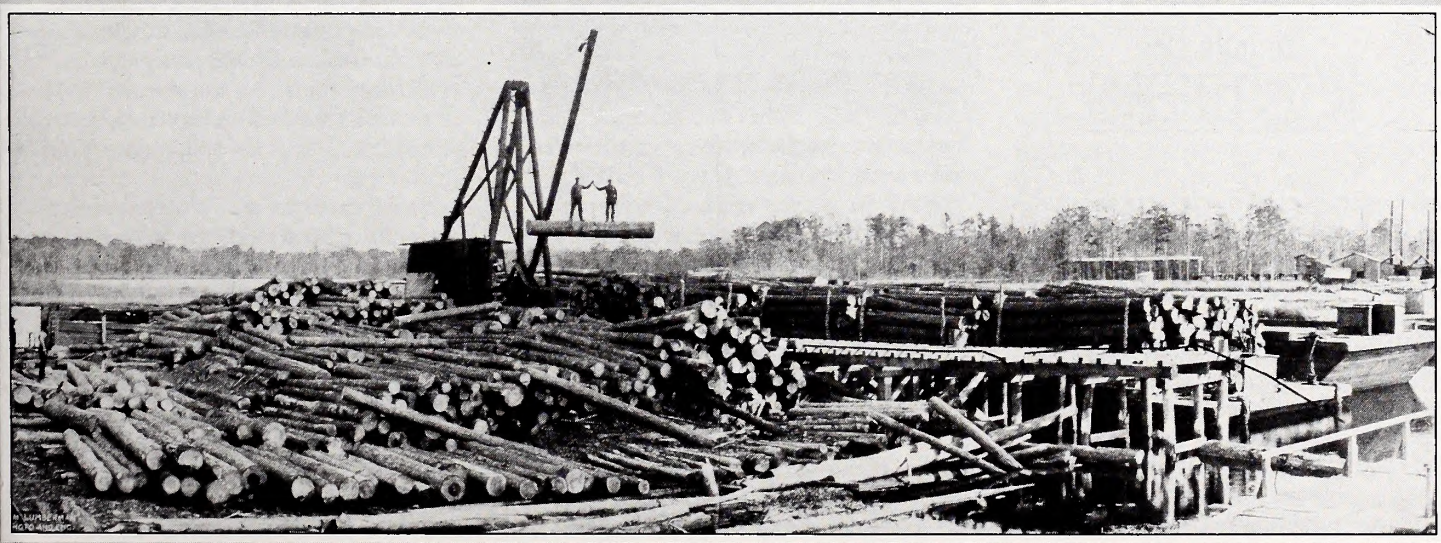
NORTH CAROLINA COLLECTION, UNC LIBRARY AT CHAPEL HILL

***Timber cutters** going into the Dismal Swamp.*

NORTH CAROLINA COLLECTION, UNC LIBRARY AT CHAPEL HILL

***Panoramic view of** the barge-loading operations of the Roper Lumber Company at Alligator, North Carolina. Barges were loaded with logs and towed to the Gilmerton plant.*

NORTH CAROLINA COLLECTION, UNC LIBRARY AT CHAPEL HILL



DISMAL SWAMP NATIONAL WILDLIFE REFUGE

The evergreen white cedar *trees are visible in winter as deciduous vegetation dies. The tree grows in pure, dense stands, but can also grow in mixed stands of hardwood trees.*

Twilight For JUNIPERS

small loggers like Bill Beety is not the problem. The problem is getting it to grow back.

Julie Moore knows more about Atlantic white cedar than most in North Carolina. A botanical specialist with the N.C. Heritage Natural Program, she has studied the wetland habitats of eastern North Carolina for many years. One simple reason for juniper's decline, she points out, is that many large stands of juniper are reaching harvestable size at the same time. That's because most of the virgin juniper was logged at the same time 70 and 80 years ago.

But aside from that, today's logging methods may be destroying the very conditions that juniper needs to grow. "Big logging operations like AFP are putting in so many drainage ditches to build roads that they are altering the hydrology of the white cedar wetlands," says Moore. "The big question is, what's going to come after the cedar is cut? Will cedar come up again, as in the past, or will it be red maple?"

Cedar can regenerate naturally — after all, large stands of cedar grew back after the intense logging of the period 1870 to 1930. But it takes special conditions for cedar to regenerate — clear ground and plenty of sunlight. Modern logging techniques may be eliminating the habitat at the same time that loggers are removing the wood.

"You need seed sources nearby, and the competition for young cedar has to be removed," says Moore. "What happens a lot of time is that the timber companies cut the cedar but leave a lot of debris — roots and branches. Cat briers and gallberries and hardwoods sprout right away, and all the little cedars can't get through it. You need something that keeps the substrate a little bare — fire is one way to do it."

To Julie Moore the solution to declining juniper stands is not to curtail cedar cutting, but to encourage cedar growing by timber companies. "That's the reason why I'd like to see more things made out of white cedar,

LAWRENCE S. EARLEY

***White cedar roots** in the Dismal Swamp are exposed as a result of a hot fire several years ago that burned through the peat soil. Historically, fires helped cedar regenerate by clearing openings in the forest for the seeds to germinate.*

because then you'd get an industry that would put some money into figuring out a management plan for growing cedar. The timber industry hasn't sunk any money into finding what you need to do to manage white cedar. And that's what we really need now."

"What are you going to do when the juniper runs out?" I asked several people down East.

Richard Dixon, Atlantic Forest Products, Edenton: "There's a possibility we'll shut down."

Vance Gillikan, boatbuilder, Harker's Island: "We're already using a lot of mahogany."

Bill Beety, sawmill operator, Manteo: "I'll be looking for a job."

The day after I visited with Bill Beety, I drove to northeastern North Carolina, to the Great Dismal Swamp National Wildlife Refuge. Originally an estimated 62,000 to 112,000 acres of juniper grew in the Dismal, but today only about 6,000 to 7,000 acres of juniper remain. The refuge is conducting several experiments with growing juniper that, if successful, will provide a basis for a full-scale management operation to restore white cedar in its traditional habitats.

Alan Carter, the refuge forester, designed the experimental plots. As we drove out to the first of them, he discussed the problems that juniper is having on the refuge. Like Julie Moore, Carter faults past logging operations in the Dismal for the decline of white cedar. "Evidently, they tilted the distribution of habitat types and vegetation types in favor of swamp hardwoods — red maple, swamp black gum and bay species," Carter said.

LAWRENCE S. EARLEY

***Cedar seedling rises** bravely from a Dismal Swamp clearing. Experiments at the Dismal Swamp National Wildlife Refuge show promise for white cedar in North Carolina.*

"They left a lot of logging slash on the ground, instead of clearing it or burning it, and this shaded out cedar seedlings.

"We're trying out ways of getting cedar seedlings established," he said.

At his first experimental plot, we picked our way carefully through a mixed hardwood stand to the juniper site. It had rained the previous week and the soil had puddled up in ankle-deep muck. At the 1-acre clearing, small island hummocks of soil rose above the puddles, and on each one I could see hundreds of little cedar seedlings.

"This was a mixed stand of mature white cedar and hardwoods," Carter explained. "We went in with a bulldozer and cleared the hardwoods and left the cedars as seed trees. Then we pushed all the debris to the side, so that we could get a bare surface as a seed bed for regeneration."

That was in July and August of 1986. The following spring, Carter returned to the area and found a flourishing garden of young cedars. Not many of them will make it, he pointed out. Deer especially like young and succulent cedar seedlings, and the mortality will be heavy. But the cedar has come back.

On his other sites, two other methods are being tried. On one, loggers cleared a 5-acre site on the east side of a cedar stand and burned the area to prepare the seed bed. No seed trees were left. This experiment would test whether prevailing westerly winds would blow seed from the adjacent cedar stand into the cleared area and regenerate the site. On a third experimental plot, Carter will transplant seedlings now growing in a Goldsboro nursery from Dismal Swamp seed. Will the head start gained by these seedlings improve their survival chances? Carter is looking forward to seeing how this test works.

For some observers of the white cedar, the wood revered by boatbuilders and decoy makers, these are the twilight years of the industry. The diminishing supply of juniper wood is forcing many boatbuilders to resort to plywood and fiberglass, and the days of the juniper skiff seem to be numbered. Carter shook his head at the long-term future of juniper.

"I would say it doesn't look very bright unless people are willing to go beyond mere preservation and are willing to take a look at restoration," he said. "What kind of active management are we willing to do to continue the species? If we're content to merely sit back and leave it alone, I'm afraid it's going to be replaced by other species."

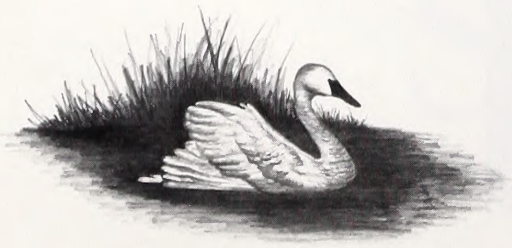
It's a simple proposition, he said. "I think man was responsible for the deline of cedar. He's also going to have to be responsible for restoring it." ⊠

Season Of The Swan

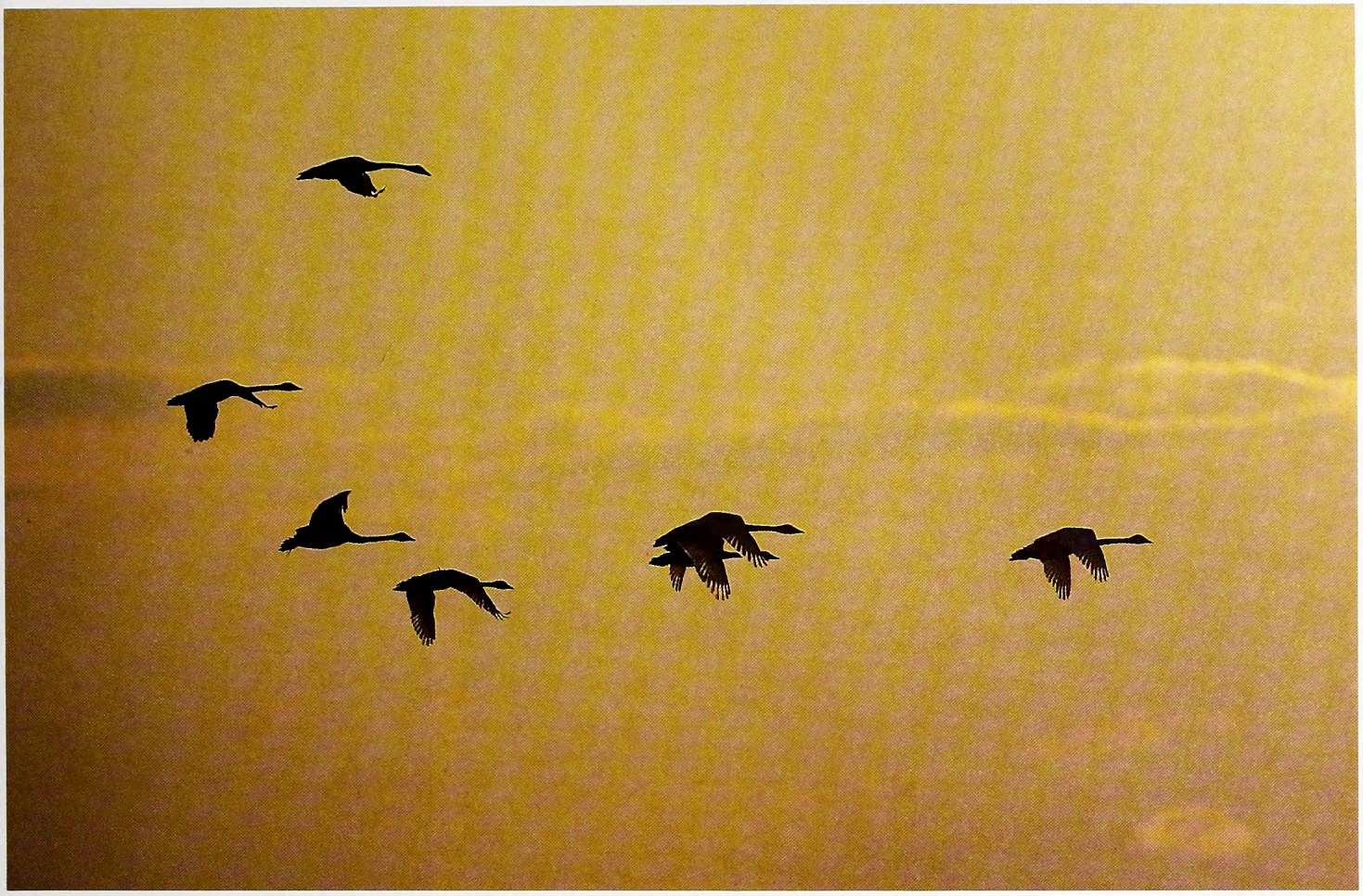
Everyone recognizes the graceful swan, and its growing numbers also make it a memorable trophy for a limited number of waterfowl hunters.

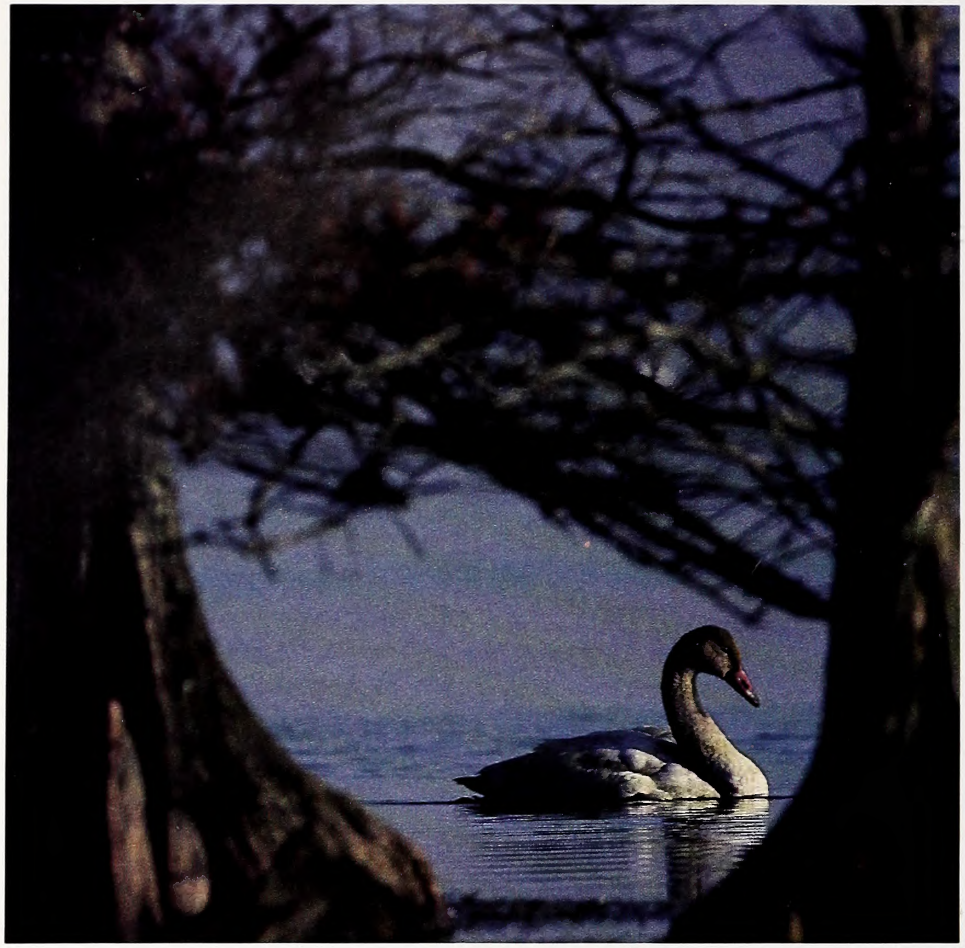
photography by Larry Ditto

Flocks of tundra swans that grace the skies of coastal North Carolina breed far to the north, in the water-filled sloughs and grassy steppes that ring the Arctic sea from Alaska eastward across Canada. In late fall the swans migrate south, spilling into the central and Atlantic flyways. Roughly 100,000 birds turn east, and an extraordinary number — between 50,000 and 60,000 — winter in Currituck and Albemarle sounds, Lake Matta-muskeet and other large lakes and adjoining coastal waters of the Albemarle-Pamlico peninsula.

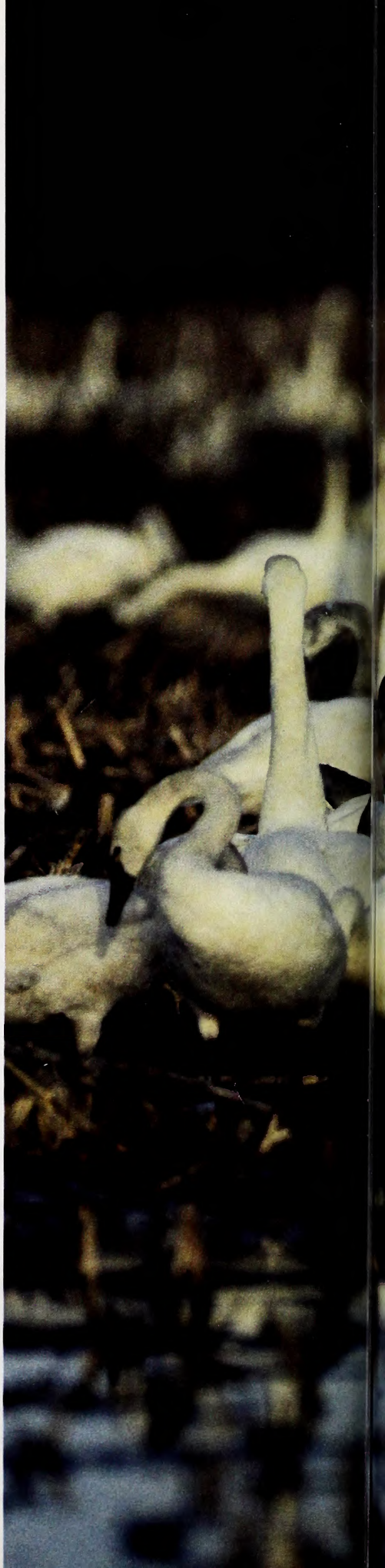


Tundra swans may well be more numerous now than at any point in the past 100 years. The birds had dwindled to a few thousand in 1918 when passage of the Migratory Bird Treaty Act outlawed commercial gunning. Over the next few decades, the tundra swan population increased steadily. The recovery of the swan, and the crop-depredation problems they were causing, prompted interest in a limited hunting season designed to stabilize the current population. In the fall and winter of 1984 and 1985, North Carolina was the first Atlantic Flyway state in 66 years to allow swan hunting. Six thousand swan tags are now available to hunters through a random drawing.





Even in the halcyon days of waterfowling, the swan was not an easy prize. The market hunters of Currituck occasionally took swans while goose hunting, but considered the birds too wary to be attracted consistently by decoys. Today, the tundra swan has changed its habits, but is still a challenge. If the hunter succeeds, he or she has a trophy bird to grace the table. If not, the sight of a large flock of swans wheeling in the distant sky is a trophy memory.



HANSON CARROLL

Chance Encounters

Woodcock are superb gamebirds, but most Tar Heel sportsmen either don't know it, or don't know how to find them.

by Eddie Nickens

"Top's looking real birdy over here."

The wind that earlier had forced us to abandon the search for quail among the hedgerows and corn stubble blew the words through the tangle of greenbrier and cane. I pushed through a curtain of thorns and branches that stood like a wall along the bank of a creek. The wind sucked the warmth out of a day that had dawned clear and cloudless. Deep in a marshy ravine to the leeward side of a corn field in Onslow County, the three of us pushed two English setters through the thickets bordering the fields, losing hope that we'd find more than a lone covey on such a blustery day. Forced from the feeding grounds by the wind that still roared through the bare treetops, the quail would be seeking shelter in the thick copse that separated the fields. Somewhere up ahead a setter was locked on a point: four paws on the ground, tail erect, muscles quivering. A lone brier scraped across my hand, bringing blood to an exposed knuckle.

A patch of blaze orange marked where Vic stood on point, waiting for Raiford and me to close in. The motionless dog was barely visible in a growth of chest-high cane. Mud sucked at our boots.

"Easy, Topper. Steady now."

With a sudden flurry a single bird broke from the bush. Skimming the cane tops, it bobbed and weaved through a slash of light in the cover. Two guns barked; the portly ball of russet and umber fell to the boggy bottom.

"Timberdoodle!" Vic yelled. "That's a woodcock!" Instantly our hunting strategy changed, as did the outcome of a quail hunt ruined by the high wind.

Hunted more often by accident than by design, the American woodcock is a quizzical bird, one whose habits and lifestyle make it excellent quarry for hunter and naturalist alike. In the hand, *Scolopax minor* is a stocky fellow with a too-long bill and black, limpid eyes set high and bulging on the forehead. On the ground, bands of blacks and browns against a body the color of dead grass render the woodcock virtually undetectable from above. And in the air, rounded wings with a span approaching 10 inches drive the birds through the woven cover that grows in the wet hardwood bottomlands they prefer.

Seneca Indian folklore maintained that "bog-suckers" were formed from the leftover parts of other birds. Pushed by cold fronts, the birds migrate south in waves from November through February, but woodcock hunting in North Carolina is often a here today-gone tomorrow proposition. When that single bird broke from classic woodcock habitat, we decided to take advantage of a hunting opportunity that's always a pleasant — if unpredictable — surprise for Tar Heel gunners.

The first bird was taken in a thicket of cane that grew from the dense bottom of a ravine choked with privet and small saplings, prime habitat for earthworms, the

HANSON CARROLL

***Hunters and dogs** cross a field enroute to likely woodcock cover in the thick, damp bottom along a stream. Though woodcock migrate through much of the state, they are more common in the eastern bottomlands than in the foothills. A woodcock flushes in thick alders (opposite page).*

woodcock's dietary staple. We walked three abreast up the gully, keeping the dogs in check to cover the ground more thoroughly. Like quail, woodcock hold tightly to cover; without a dog to flush them, the birds may well hold their ground while a hunter walks by. From up ahead we heard the woodcock's whistle, a delicate *peent* like the tapping of a fork against crystal. This time the setter Ranger tightened up; the dog froze for a second, then strained forward as if towing a heavy load, restrained by the plaintive tone in Raiford's voice.

"Easy. Easy now."

And again, a whirl of wings as two birds flushed, dancing and trilling in that oddball flight that immediately distinguishes the woodcock from other upland game birds: the long bill cocked downwards, the stout body pulled along by the wings. The wind carried the gunblasts into the trees while one timberdoodle spiraled to the ground and the other disappeared into the brush.

"We're in 'em now, boys."

And that's how it happens for gunners lucky enough to stumble on the right place at the right time for woodcock, an opportunistic bird that demands an equally opportunistic hunter.

Though normally considered a species more gainfully sought by northern hunters (in a 1972-73 survey, woodcock ranked 14th

Woodcocks frequently sit tight until flushed, but unlike quail, they tend to rise above the thick cover before angling off, and hunters often have a chance at a quick, clear shot.

out of 15 game species among North Carolina hunters), the woodcock's range extends through North Carolina to the Gulf States. The coastal and Piedmont sections of the state harbor a fair number of wintering birds, and at times huntable populations of woodcock are found from the mountains to the sea. Still, the state's woodcock harvest is largely an accidental one. In surveys taken in North Carolina from 1974-76, between 30 and 40 percent of the yearly returns of woodcock were taken while hunting quail, rabbit, grouse, duck or squirrel. Clearly the challenge facing Tar Heel gunners with a taste for timberdoodle is improving the odds of finding the birds.

Like waterfowlers, hunters intent on actively pursuing woodcock in North Carolina should pay particular attention to the weather. Woodcock feed almost exclusively on earthworms; they probe the soft earth with highly developed bills that are tailor-made for the job of finding and retrieving their favorite food. The woodcock's bill is a highly specialized device with a bundle of nerve endings on the tip. The bill is capable of detecting the presence of earthworm mucus for up to 24 hours after worms have passed through an area. In addition, the outer third of the bill can move independently — like mobile tweezers — enabling woodcock to pluck an earthworm from the soil even with its bill buried underground. When the ground freezes, the woodcock leave. It's that simple. Weather-wise hunters also keep in mind that the bird migrates in front of major weather systems — yet another reason to keep tuned to the 11 o'clock news.

But if you can't always tell *when* the birds will be in the area, there are tips on where they go — and how they spend their day — that the savvy gunner can put to use. Though few North Carolina sportsmen would call themselves woodcock hunters, those that do take to the fields specifically for the timberdoodle have learned to tailor their tactics to the birds' habitat preferences and personality quirks.

During the day, woodcock spend their time in wet, thickly wooded areas. River bottoms harbor the most birds, and the coastal areas of North Carolina attract the largest number of both migrating woodcock and wintering stock. One of the state's rare woodcock hunters, Dr. Phil Doerr, professor of zoology at North Carolina State Uni-

HANSON CARROLL

Vic's Best

Chances are it was by supernatural design that the woodcock and oyster seasons run concurrently; together the two form a hard-to-beat combination for the grill. Try this recipe the next time the winds of fate blow in your favor and you're blessed with a game bag of timberdoodle.

6 woodcock, plucked and cleaned
6 strips of bacon
9-12 fresh oysters
thyme
garlic
butter

Lightly saute the oysters in butter with garlic added to taste. Season the woodcock with thyme, to taste, then stuff the birds with the oysters, about three to four oysters per bird. Wrap the birds with bacon and fasten with a toothpick. Grill over live coals, turning once, and keep the meat close to the bone pink. Be careful. As with quail, perfection is within moments of disaster.

JOEL ARRINGTON

A woodcock sitting *on the ground is well camouflaged and nearly impossible to spot. The long bill is used to probe in damp soil for earthworms, and a hard freeze will invariably cause the birds to move out in search of softer ground.*

versity, also happens to be a wildlife biologist who has studied the birds for years. He can be walking along any bottomland in the Piedmont or Coastal Plain when suddenly, he says, it hits him: woodcock habitat. Swamp privet and alder are the first clues; not only do the plants require moist soil to flourish, but the plants have leafy tops without a great number of stalks and leaves close to the ground, a requirement for the woodcock who need to move around quite a bit in order to probe. Cane is also indicative of prime woodcock habitat, he says. And the birds seem to prefer hardwood stands that have been clear-cut during the past five to 15 years or old fields that are in an intermediate stage of growth succession. If the trees are any older, the woods open up too much for the timid timberdoodle. Anytime you're walking through bottomlands so thick that you think, "If a woodcock gets up here I'll never get a shot off," then get ready, Doerr says.

But the most important sign to look for are the chalky white woodcock droppings known as splash. If woodcock are in the area, they'll no doubt leave that signpost. And while probing marks may be evident — small holes in the soil where the birds have probed for earthworms — they're not as easily seen as splash.

As dusk approaches, woodcock move from their daylight cover areas to feeding fields. Research by North Carolina State University has shown that woodcock prefer cutover soybean fields to disked corn or winter wheat. Soybeans are most often planted in furrows, and the small valleys between the furrows collect debris from the stalks. That debris has a twofold purpose in attracting feeding woodcock. Not only does it decay, enriching the soil and making it more attractive to earthworms, but it provides an insulating layer of duff that keeps the ground from freezing as quickly as the surrounding land. Tests during woodcock surveys in the mid- to late-70s in an area south of Lake Mattamuskeet found that cutover soybean fields harbored hundreds of woodcock while surrounding fields of disked corn and winter wheat were nearly barren of the birds.

What does all this science mean to the average hunter? It means you can cut the odds and concentrate on the places and times that you're most likely to find woodcock. Watch the weather fronts for extremely cold air moving in from the north. Concentrate on those areas that are most likely to appeal to the birds: thickly wooded areas that lie near fields. If you have a choice between soybean fields and fields that have been disked, try the woods lying next to the cutover soybean first. Good shooting may also be expected near some of the large reservoirs in the Piedmont and Coastal Plains. Before it was flooded, the New Hope area that is now Jordan Lake harbored good populations of woodcock, and flushes there were not uncommon. Try walking up the necks of the lakes until the water turns into a creek. The thickets that often close in near such areas may afford a quick shot at passing timberdoodle. Of the public hunting areas that draw woodcock, Gull Rock Game Lands in Hyde County is a favorite, and most suitable habitats in the central and eastern portions of the state will hold migrating woodcock when weather conditions are right.

Short-barreled guns are best in the thick cover the woodcock prefers and, although any good quail dog should prove adequate on woodcock, Vic stoutly maintains that the close-hunting setters cover the ground more thoroughly and therefore offer the best bet for digging out woodcock, although the farther-ranging pointers may cover more area. Keep in mind that the season for woodcock ends earlier than that for other upland species, often affording woodcock in the game bag only through January. Birds have been discovered engaging in courtship rituals in North Carolina as early as December, and although the 1987 breeding level indexes (number of singing males per survey route) for the Eastern Region of the United States did increase 3.8 percent over last year's figure, the population level of woodcock is still at a low level.

Woodcock in North Carolina during the hunting season generally have just completed an arduous southerly migration or are getting ready for the last leg of one begun many miles and some months before. The majority of birds found in the state during the hunting season are juvenile males, and hunters who pursue the species soon discover that the males are generally much smaller than female woodcock — averaging about 160 grams to the females' 190 — although the color and marking of the birds are nearly identical. During the early spring the males will begin their intricate courtship flights on "singing grounds." The birds will soar into the air until barely visible, then spiral and plummet to the ground in a dance that attracts the attention, and perhaps the affection, of the breeding females.

But timberdoodles that call North Carolina home for a winter's night or a wintering season seem content to puzzle and perplex the hunters who take to the fields in the hope of adding a woodcock or two to the game bag. Before the end of the day nearly 30 woodcock had flushed before us from the neighboring woods — in addition to a covey of quail. That such a hunt is a rarity for North Carolina gunners makes the whimsical woodcock a much-prized quarry for hunters lucky enough — or smart enough — to put themselves in the right place when the right time comes along. ⊠

Works With Youth, Habitat

Quail Unlimited Builds For Future

Written and Edited by Mark Taylor

General Lee of Smithfield may not command an army of thousands, but he's a commander when it comes to fund-raising.

The Johnston County Chapter of Quail Unlimited, of which Lee is banquet and auction chairman, has raised $13,000 to fund habitat improvement for quail, locally as well as statewide.

Of that $13,000, the 100-member Johnston County Quail Unlimited Chapter has donated more than $600 to the Wildlife Commission for quail research and habitat improvements. Some of the remainder is spent in Johnston County teaching students how to manage and preserve good habitat for quail.

"I'm very enthusiastic about Quail Unlimited's methods of raising money to help the quail populations in North Carolina," Lee said. "Locally, we'll buy and distribute fertilizer and seeds to individuals and schools so they can help us improve quail habitats."

The club seeks out FFA (Future Farmers of America) clubs in each of the county schools for help in planting one-eighth-acre, or larger, plots of quail food. Currently, the club boasts more than 150 plots planted through the schools' FFA and 4-H programs. The Quail Unlimited chapter awards prizes of first, second and third places to the clubs in the northern, southern, eastern and western parts of the county that produce the best fields.

"We've had such good response from this program," said Joe Moore of Selma, chairman of the Johnston County Quail Unlimited Club. "We believe that if the young people start planting quail fields now, it will stick with them as they grow up. It's fantastic to see this program work.

"It's working great this year. I hope it will continue," he said.

One of Moore's club's methods of fund-raising is the annual auction and banquet, an event familiar to all the state's Quail Unlimited chapters. Another is the "sponsor" method in which individuals are encouraged to give $200 or more. The 3-year-old Johnston County Quail Unlimited Club was the first in the state to develop the "sponsor" method of fund-raising.

ANGELA HILL

All For The Birds: *Three members of the Johnston County Chapter of Quail Unlimited present a check for $616 to Wildlife Commission biologist Mike Scruggs while standing in one of more than 200 plots of planted quail food in Johnston County. From left are Ernie Ward, secretary/treasurer of the Quail Unlimited club; Joe Moore, chapter chairman; Scruggs; and General Lee, sponsor and banquet chairman for the chapter.*

JACK DERMID

The Winner: *Increasing bobwhite quail populations is the goal of the habitat work done by Quail Unlimited. Biologists have found that habitat management is the most effective way to maintain healthy quail populations. This management also benefits many other wildlife species.*

Reader Raises Issue

Wildlife Trade Can Be Legal

Dear *Wildlife:*

In the July issue of *Wildlife in North Carolina*, I read an article in reference to commercial trade in wildlife. The sale of bear claws is and should be illegal, but to state that "commercial trade in wildlife or any part of wildlife is illegal" is in error. Furthermore, it could have a negative effect on a legitimate, licensed business wherein the sale of certain forms of wildlife is legal. This is particularly true when dealing with exotic forms of wildlife and lawfully taken furbearers within the state.

Your magazine does a wonderful job of educating the general public. I have held a subscription since 1960 and will continue to, but let's be fair and accurate.

—J.W. Fuchs, Director,
N.C. Taxidermist Association
Franklin, N.C.

Chases Canada Goose

Chipmunk King Of Corn Hill

I have lived on a 67-acre man-made lake for 30 years. Now retired, I am able to devote much time to a lifetime interest in wildlife, guided largely by your fine publication.

For the past 30 years, I have fed some whole corn to incubator-raised wild mallards and other wild ducks on a platform-feeding station 15 feet out in the lake. Over the last 10 years this feeding station has attracted up to 50 local wood ducks, a few coots, and other strangers.

About 20 years ago, I acquired a pair of Canada Geese from a midwestern dealer. When the pair grew up they flew off. Only one, the female, returned with a shot-up leg "to tell the story." Apparently she never remated, and would fly away late each summer and return each February.

I always put out just enough corn to feed the goose and ducks, but try to discourage gray squirrels, ground squirrels, crows and doves. When the goose is eating, she occasionally tolerates the presence of a few wood ducks or doves. But everything else stays away until she eats, preens and leaves the station.

The other morning the tables were turned, however. Everyone was waiting around as "Madam Queen" took full advantage of her position at the top of the pecking order when a feisty little chipmunk showed up and challenged her. He would streak in at her as fast as he could go, looking like he planned to tear her apart, then skid to a quick halt 6 to 10 inches short of her bill. Then, he would retreat as fast as his legs would carry him while she raised her powerful and deadly wings and got ready to strike with the nail on her bill. Still, she was obviously upset and startled.

On each foray, the chipmunk would retreat about 6 feet before rushing her again. After six of these encounters, the goose got off the feeding station and left the new "king of the mountain" secure on the top of the large pile of corn. The other ducks were impressed, and slowly and cautiously slipped aboard to eat around the periphery, showing due respect as the chipmunk filled his cheeks and made a number of fast hauls across my bridge to shore and to his den.

— Louie Reese
Trussville, Alabama

Field Notes

Season openings, closings, and regulation changes:

- Deer:
  - ⋆ Eastern gun deer season open through Jan. 1.
  - ⋆ Central gun deer season open through Jan. 1.
  - ⋆ Northwestern gun deer season open through Dec. 5.
  - ⋆ Western gun deer season open through Dec. 12.
- Western bear season open from Dec. 14-Jan. 1.
- Wild boar season open from Dec. 14-Jan. 1.
- Gray and red squirrel season open through Jan. 30.
- Fox squirrel season (in open counties) open through Dec. 31.
- Rabbit season open through Feb. 29.
- Quail season open through Feb. 29.
- Ruffed grouse season open through Feb. 29.
- Pheasant season (male birds only) open through Feb. 1.
- Western raccoon season open through Jan. 30.
- Eastern raccoon season open through Feb. 29.
- Woodcock season open through Jan. 4.
- Common snipe season open through Feb. 27.
- Mourning dove season open from Dec. 18-Jan. 9.
- Duck season open from Dec. 14-Jan. 16.
- Sea duck season open through Jan. 16.
- Snow goose season open through Jan. 30.
- Canada goose season open from Dec. 31-Jan. 16.
- Brant season open from Dec. 18-Jan. 16.
- Tundra swan season (by permit only) open through Jan. 30.

Check *Regulations Digest* for information on either-sex hunts, season boundaries, bag limits, and other regulations. Copies of waterfowl regulations are available from license agents.

Sportsmen are reminded that all big game (deer, bear, wild boar) must be tagged and reported to a wildlife cooperator agent.

Antique Decoys To Be Shown

North Carolina waterfowl decoys are the subject of a special exhibit entitled "Decoys Unlimited" that is currently being featured at the Museum of the Albemarle in Elizabeth City.

The exhibit features the work of well-known North Carolina decoy carvers and other waterfowling memorabilia.

The museum is located on Highway 17 south, and is open from Tuesday through Saturday from 9 a.m. through 5 p.m. Decoys Unlimited will be on display through January 10.

Feeds Whole Family

Duck Gumbo Has Cajun Connection

Cajun cooking has become the rage lately, and these spicy dishes can be found on the menus of some of the nation's most elegant hash houses. This recipe was contributed by Susan Sharpe of Hamlet.

Duck Gumbo (Cajun-Style)

2-3 ducks
2-3 onions (peeled and diced)
2 bell peppers
4-5 stalks celery with leaves

Cook ducks until tender. Remove from pot and debone. Reserve broth. Next you make a Roux which is the basis of all large gumbo recipes. Melt 2 tablespoons margarine or bacon drippings or shortening over low heat in heavy fry pan. Then add 2 tablespoons flour very slowly, stirring constantly (do not stop for a second). When mixture turns a dark brown or chocolate color take off heat but continue to stir. Put Roux in crockpot or heavy Dutch oven. Add broth in which ducks were cooked and water to pot. Add onions, peppers, and celery that have been peeled and diced. Add salt, pepper, red pepper, Worcestershire sauce. Cook over low heat in crock pot or on top of stove 3-4 hours. Serve over rice.

Supports Sales Contest

Safari Club Boosts Wildlife

ANGELA HILL

A Helping Hand: *The Carolinas Chapter of the Safari Club was recently honored with a plaque for underwriting a license sales contest which resulted in more than $65,000 being generated for the Wildlife Endowment Fund. From left to right are Tom Smith, current president of the chapter, Paul Thompson, immediate past president, and Eddie Bridges, Wildlife Commissioner for District 5.*

Ten Are Lifetime Sportsmen

Patterson Family Has Tradition

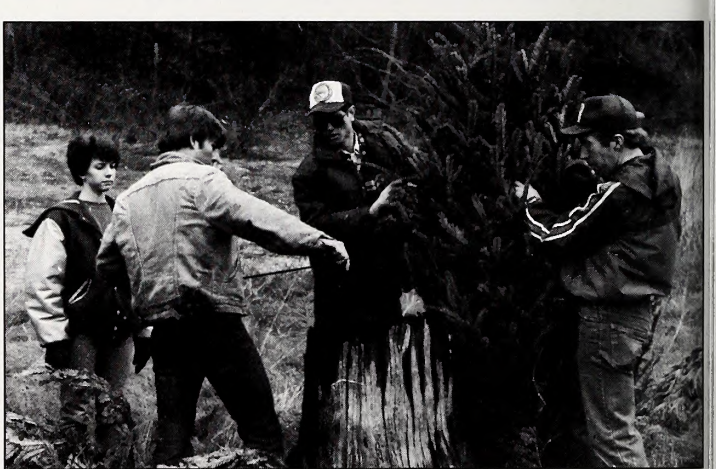
The Pattersons of Spencer are doing their best to keep hunting and fishing a family tradition. How? John Patterson Sr., who served as a wildlife enforcement officer in Cabarrus County in the early 1950s before going into business in Salisbury, recently bought lifetime sportsman's licenses for every male member of his family.

"My father had three sons, and we all grew up hunting and fishing together," said his son Danny Patterson. "Several months ago, he bought lifetime sportsman's licenses for me, my brothers Johnny and Rufty, and my brother-in-law Robert Kluttz. He also bought lifetime sportsman's licenses for each of his six male grandchildren."

All of Patterson's sons still live in Spencer, and his son-in-law lives in nearby Salisbury. The whole family enjoys hunting and fishing together.

"My father always loved wildlife, and still likes to go dove hunting and fishing," Danny Patterson recalled. "These things always meant a lot to him, and he wants to be sure that his grandsons have the same chance to enjoy the outdoors that we had growing up."

New Life For Old Christmas Trees



Fish Cover On The Stump: *The Science Club at the Blue Ridge High School in Jackson County found that Christmas trees serve a second purpose — fish cover.*

The students collected old Christmas trees last year, lashed them together and tied them to stumps on the bottom of drawn-down Lake Glenville. When the lake is full, the shelters will be in water 8 to 15 feet deep. They will float like an umbrella, providing shade and shelter for fish.

The project was directed by Wildlife Commission District 9 fisheries biologist Bennett Wynne and Science Club Advisor James Buchanan. The students were also assisted by representatives of the Southwestern Area Resource Conservation and Development Council, Nantahala Power and Light Company, the Jackson County Sportsmen's Association, and the Wildlife Commission.

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CALO 88

Organization Seeks Nesting Colonies

Purple Martin Numbers Decline

A new organization was recently formed to help increase the purple martin population. The Purple Martin Conservation Association, based in Edinboro, Pennsylvania, is seeking to determine the locations of at least 10,000 purple martin colonies.

"There is overwhelming evidence that the purple martin is in trouble," said James Hill, executive director of the Purple Martin Conservation Association. "Since 1975, the National Audubon Society has listed the purple martin on its 'blue list' of birds in trouble, and the annual breeding surveys conducted by the U.S. Fish and Wildlife Service confirm these claims. Over the past 20 years, there have been significant declines in purple martin populations throughout their range. Even more convincing are the accounts from ornithological journals from the 1800s, which show that the birds were extremely abundant in the past."

Purple martins were very common in the 1700s and 1800s, and early settlers became attached to the colorful, insect-eating songbirds. In fact, when the Europeans settled America they found that the Choctaw and Chickasaw Indians in the Mississippi Valley hung nesting gourds from their wigwams to attract purple martins to their villages. The birds ate flies, and also drove other birds from the cornfields adjacent to their nests. Early settlers followed suit, and the population grew. In the late 1800s, however, the importation of two exotic birds to the New World — the European starling and the English house sparrow — sparked the purple martin's decline.

"Both of these exotic species are nonmigratory, and are extremely territorial," said Hill. "Purple martins winter in South America, and when they return to nest they often find their nesting sites occupied by starlings or sparrows. These birds are very aggressive, and the purple martins either have to drive them off or find a new nesting site. They generally look for other nesting areas, and have been declining because the other birds have a real advantage. There have also been problems with roosting birds being lost to pesticide poisoning on their wintering grounds in South America."

Purple martins in the eastern United States are dependent upon man-made structures for nesting, such as martin houses or hollow gourds. In the West they often nest in hollows in cactus, but are still heavily dependent upon man. One of the goals of the Purple Martin Conservation Association is to contact as many "landlords," whose nesting houses hold colonies, as possible.

"We estimate that 80 percent of the purple martin houses which are erected fail to attract the birds," said Hill. "Often, this occurs because the houses are placed in poor habitat. Another problem is that many people don't take these houses down for the winter, or block the entrances, and they become occupied by starlings and sparrows. By contacting as many landlords as possible, we hope to make them better wildlife managers. Also, our registry of colonies will give us good data on purple martin populations and trends. We'd appreciate it if anyone who has or knows the location of a nesting colony, or is interested in attracting these birds, would contact us."

More information is available from the Purple Martin Conservation Association, P.O. Box 178, Edinboro, Pennsylvania 16412.

Calendar Of Events

December 5
Christmas Past at the Fort Fisher State Historic Site at Fort Fisher. Nineteenth-century foods and Christmas customs in addition to the usual educational exhibits.

December 18-19
Old Salem Christmas at Winston-Salem. Displays of 18th-century crafts, Christmas customs, and period music.

December 19-January 1
Christmas at the Zoo at the North Carolina Zoological Park. Special Christmas activities for children.

The Wildlife Endowment Fund Report

The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife in North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Status on September 30, 1987

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	43,698	$12,658,797.07
Lifetime Hunting License	265	55,515.54
Lifetime Fishing License	3,264	561,292.73
Lifetime Subscriptions to Wildlife in N.C.	1,192	148,134.31
Contributions	—	92,813.39
Fund Total		$13,516,553.04
Total Interest Earned	$2,104,783.30	

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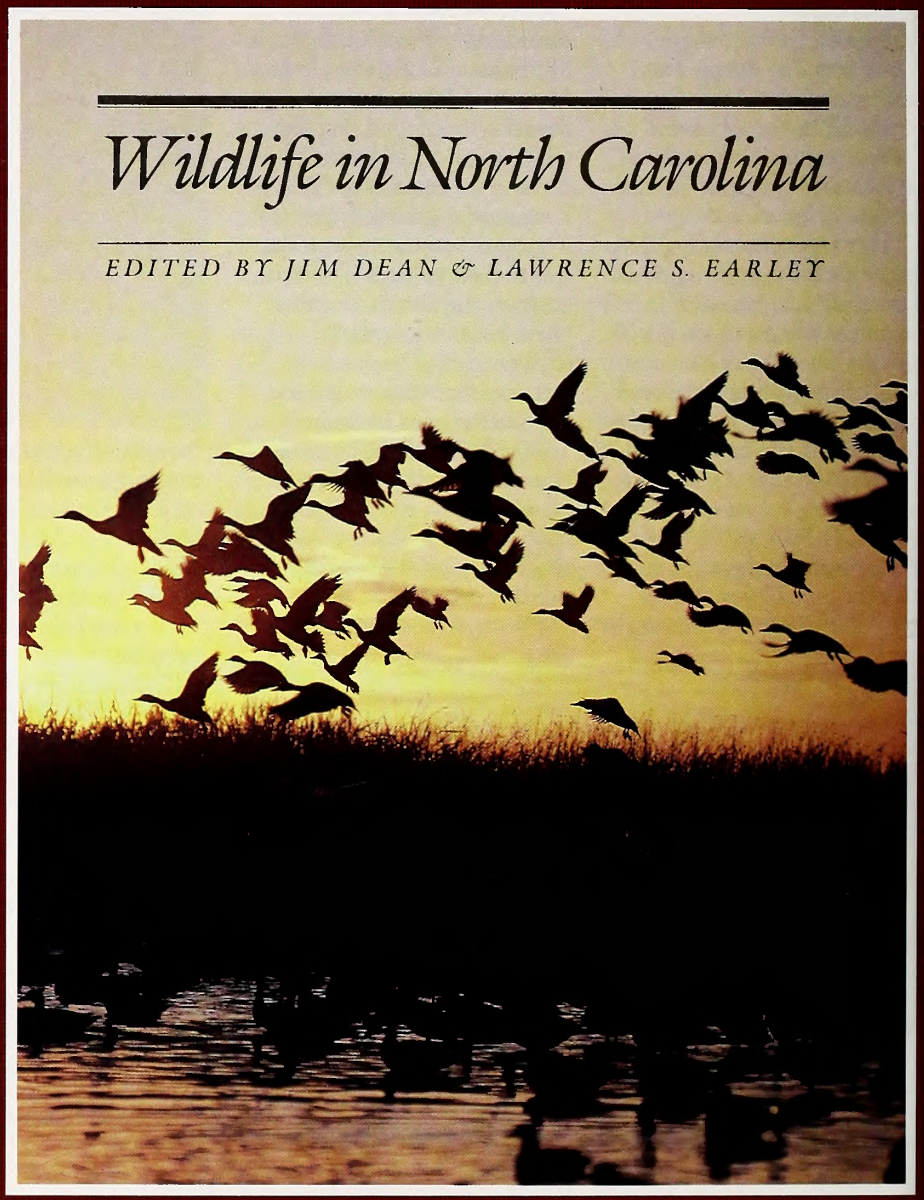

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Snows And Swans

A cold morning fog cloaks the Mattamuskeet marsh, but feeding snow geese and tundra swans are well protected from the elements.

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